ETMM11 - ERCOFTAC SYMPOSIUM

11th International ERCOFTAC Symposium on
Engineering Turbulence Modelling and Measurements

21-23 September 2016 - Palermo

Conference Program

Produced: 19 Sep, 2016

Organisers

Partners

Coordinator

Overview Programme

Time/Day	Wednesday, 21 September			
	Registration/ Support Desk hours (08:00 - 13:00 & 14:00 - 17:00)			
08:45-09:00	**Welcome and Orientation**			
09:00-09:45	**Karen Flack** (United States Naval Academy) The relationship between surface topography and frictional drag			
09:45-10:30	**Vladimir Nikora** (University of Aberdeen) Turbulence in open-channel flows: recent advances and implications for sediment transport, hydraulic resistance and flow-biota interactions			
10:30-11:00	**Coffee Break**			
11:00-12:40	Hybrid RANS-LES	Particle-laden flow 1	Combustion 1	Wall-bounded flow 1
12:40-14:00	**Lunch**			
14:00-15:40	Wall-bounded flow 2	Particle-laden flow 2	Combustion 2	Experimental fluid mechanics 1
15:40-16:10	**Coffee Break**			
16:10-17:50	DNS for LES	Jet flows	Experimental fluid mechanics 2	Compressible flow
19:00-20:30	**Welcome Reception** Room: Palazzo Sterri (University of Palermo)			

Time/Day	Thursday, 22 September			
	Registration/ Support Desk hours (08:30 - 13:00 & 14:00 - 17:00)			
09:00-09:45	**Simone Hochgreb** (Cambridge) Understanding the structure and dynamics of turbulent reacting flows via selective experiments			
09:45-10:30	**Alfredo Pinelli** (City University of London) Flow manipulation based on passive and localised fluid structure interactions			
10:30-11:00	**Coffee Break**			
11:00-12:40	Flames 1	Manipulated turbulence 1	High fidelity methods 1	Heat Transfer 1
12:40-14:00	**Lunch**			
14:00-15:40	Heat transfer 2	Flames 2	Manipulated turbulence 2	High-fidelity methods 2
15:40-16:10	**Coffee Break**			
16:10-17:50	Turbulence Fundamentals	Bluff body flow	Phase transition	Turbulence-reaction modeling
19:00-22:00	**Conference Dinner** Place: Villa Niscemi			

Time/Day	Friday, 23 September			
	Registration/ Support Desk hours (08:30 - 13:00)			
09:00-09:45	**Sutanu Sarkar** (UCSD) Turbulence at rough topography in the deep ocean			
09:45-10:30	**Detlef Lohse** (University of Twente) Turbulent Rayleigh-Benard and Taylor-Couette flow			
10:30-11:00	**Coffee Break**			
11:00-12:40	Transition	Turbulence models	LES 1	Noise and acoustics
12:40-14:00	**Lunch**			
14:00-15:40	EUROTURBO	LES 2	Friction and drag	Separated flow
15:40-16:00	**Closing address - Announcing ETMM12**			

Wednesday, 21 September

08:45-09:00	**Welcome and Orientation** *Chair: Bernard Geurts | Room: Normanni*			
09:00-09:45	**Karen Flack** (United States Naval Academy) The relationship between surface topography and frictional drag *Chair: Bernard Geurts | Room: Normanni*			
09:45-10:30	**Vladimir Nikora** (University of Aberdeen) Turbulence in open-channel flows: recent advances and implications for sediment transport, hydraulic resistance and flow-biota interactions *Chair: Tullio Tucciarelli | Room: Normanni*			
10:30-11:00	**Coffee Break**			
11:00-12:40	Room: Normanni	Room: Ruggero	Room: Angelica	Room: Basile
	Hybrid RANS-LES *Chair: Helfried Steiner*	**Particle-laden flow 1** *Chair: Maria Vittoria Salvetti*	**Combustion 1** *Chair: Epaminondas Mastorakos*	**Wall-bounded flow 1** *Chair: Philippe Spalart*
11:00	Advanced Hybrid RANS-LES Simulations of Supersonic Flow over a Shallow Cavity with Leading-edge Serration *Kunyu Luo, Zhixiang Xiao*	Large eddy simulation of particle-particle interactions in turbulent flow: collision, agglomeration and break-up events *Derrick Njobuenwu, Michael Fairweather*	Effect of gas phase reactions on biomass pyrolysis and combustion in a turbulent channel flow *Abhijay Awasthi, J. G. M. Kuerten, B. J. Geurts*	Large-eddy simulation of wall-bounded high-Reynolds numbers flows. *Matteo Montecchia, Geert Brethouwer, Arne V. Johansson, Stefan Wallin*
11:20	Evaluation of Grey Area Mitigation Tools within Zonal and Non-Zonal RANS-LES Approaches in Flows with Pressure Induced Separation *Dieter Schwamborn, Axel Probst, Andre Garbaruk, Ekaterina Guseva, Misha Shur, Mikhail Strelets, Andrey Travin*	DNS study of fusion reactor dust particle mobilization induced by a transonic jet into a vacuum container *Gabriele Camerlengo, Domenico Borello, Jörn Sesterhenn, Alessandro Salvagni*	Turbulent Scalar Fluxes in Detailed Chemistry Based Premixed Flame DNS Simulations of H2-air Flames in Different Regimes of Combustion *Markus Klein, Christian Kasten, Nilanjan Chakraborty, Paul Guillermo Arias, Hong Im*	The effects of roughness on the boundary layer development of a circular cylinder *Ivette Rodriguez, Oriol Lehmkuhl, Ugo Piomelli, Jorge Chiva, Ricard Borrell, Assensi Oliva*
11:40	On a Modification of the Three-equation k-kL-omega Model for Natural Transition in Adverse Pressure Gradient Flows *Jiří Fürst, Jaromír Příhoda*	The Influence of Gravity on Particle Collision and Agglomeration in Turbulent Channel Flows *Tosanbami Ogholaja, Michael Fairweather, Derrick Njobuenwu*	A subgrid scale combustion model based on an explicit expression for the Kolmogorov length scale *Katsuhiro Hiraoka, Yoshitsugu Naka, Yuki Minamoto, Masayasu Shimura, Mamoru Tanahashi*	The effect of wall normal actuation on a turbulent boundary layer *Stefan C. Schlanderer, Nicholas Hutchins, Richard Sandberg*
12:00	Spatio-temporal analysis of transonic wake flow of space launchers via zonal RANS-LES and DMD *Vladimir Statnikov, Matthias Meinke, Wolfgang Schröder*	The influence of particle concentration on the fluid phase of an axisymmetric multiphase impinging jet *John Vickers, Michael Fairweather, David Harbottle*	Coupling Reduced-Order Model with LES to Simulate Transverse Combustion Instability in a Multi-injector Combustor *Principio Tudisco, Suresh Menon*	Interaction of rectangular synthetic jets with a turbulent boundary layer : Influence of the actuation parameters and orientation effect *Guillaume Gomit, Tim Berk, Bharathram Ganapathisubramani*
12:20	-	Effect of Four-Way Coupling on the Turbulence Field in Multi-Phase Channel Flows *Lee Mortimer, Mike Fairweather, Derrick Njobuenwu*	Investigation of autoignition and combustion stability of supercritical carbon dioxide oxy-combustion *Benjamin Farcy, Suresh Menon*	Scaling of streamwise turbulence intensities of boundary layers approaching separation *Artur Dróżdż, Witold Elsner*
12:40-14:00	**Lunch**			

Wednesday, 21 September

14:00-15:40	Room: Normanni	Room: Ruggero	Room: Angelica	Room: Basile
	Wall-bounded flow 2 *Chair: Philipp Schlatter*	**Particle-laden flow 2** *Chair: Detlef Lohse*	**Combustion 2** *Chair: Simone Hochgreb*	**Experimental fluid mechanics 1** *Chair: Stefan Wallin*
14:00	Direct numerical simulation and theory of a wall-bounded flow with zero skin friction *Gary N Coleman, Sergio Pirozzoli, Maurizio Quadrio, Philippe Spalart*	Simulation of Sediment transport and flow characteristics downstream of a hydraulic structure *Donatella Termini*	Influence of the turbulent combustion modeling on flame dynamics in a swirled confined non-adiabatic combustor *Adrien Chatelier, Renaud Mercier, Thibault Guiberti, Nicolas Bertier, Daniel Durox, Thierry Schuller, Benoit Fiorina*	An experimental study of turbulent boundary layer approaching separation *Witold Elsner, Artur Dróżdż*
14:20	Influence of a large-eddy-breakup-device on the turbulent interface of boundary layers *Cheng Chin, Jason Monty, Andrew Ooi, Ramis Örlü, Philipp Schlatter, Nicholas Hutchins*	Direct numerical simulation of sediment transport over irregular sediment bed in an open channel flow *Ramandeep Jain, Bernhard Vowinckel, Jochen Fröhlich*	The impact of the fine structure reactor formulation in the Eddy Dissipation Concept for MILD combustion modelling *Michał Tadeusz Lewandowski, Ivar Ståle Ertesvåg*	Extracting Time-Dependent Mass-Flow Rate from a Vortex-Meter *Christopher Ford, Henrik Alfredsson*
14:40	Revisiting tripping effects in low-Reynolds number turbulent boundary layers *Ramis Örlü, Carlos Sanmiguel Vila, Ricardo Vinuesa, Stefano Discetti, Andrea Ianiro, Philipp Schlatter*	Stochastic modeling of cluster-induced turbulence *Alessio Innocenti, Sergio Chibbaro, Maria Vittoria Salvetti*	Numerical study of combustion and NOx emissions under extreme Miller conditions in a heavy-duty diesel engine with pilot-injections *Sushant Sunil Pandurangi, Yuri Martin Wright, Konstantinos Boulouchos*	Revisiting Hot-Wire Anemometry Close to Solid Walls *Yuta Ikeya, Ramis Örlü, Koji Fukagata, P. H. Alfredsson*
15:00	Assessment of turbulent boundary layers on a NACA4412 wing section at moderate Re *Ricardo Vinuesa, Seyed M. Hosseini, Ardeshir Hanifi, Dan S. Henningson, Philipp Schlatter*	Performance evaluation of the mesoscale turbulence parameterization schemes for the prediction of dust storms *Orkun Temel, Ozgur Karatekin, Jeroen van Beeck, Francesca Esposito*	Direct numerical simulation of the flow in the intake pipe of an internal combustion engine *Georgios Giannakopoulos, Christos Frouzakis, Paul Fischer, Ananias Tomboulides, Konstantinos Boulouchos*	Velocity and Pressure Measurements in a Wire-Wrapped 61-Pin Hexagonal Fuel Bundle *Rodolfo Vaghetto, Nolan Goth, Philip Jones, Saya Lee, thien Nguyen, Yassin Hassan*
15:20	Effect of Geometrical Arrangement of Stator Ventilation Channels on Air Flow Losses in a Hydro Generator Model *Hamed Jamshidi, Håkan Nilsson*	Turbulence in Solid Particle Erosion: A meshless method approach *Wiebke Boden, Stephane Aubert, Jean-Christophe Marongiu, Richard Perkins*	Modelling of spray flames with Double Conditional Moment Closure *Philip Sitte, Epaminondas Mastorakos*	Laboratory Experiment on the environment for non-supercell tornado genesis *Koji Sassa, Hanaka Watanabe*
15:40-16:10	**Coffee Break**			

Wednesday, 21 September

16:10-17:50	Room: Normanni	Room: Ruggero	Room: Angelica	Room: Basile
	DNS for LES *Chair: Alfredo Pinelli*	**Jet flows** *Chair: Dieter Schwamborn*	**Experimental fluid mechanics 2** *Chair: Stefan Wallin*	**Compressible flow** *Chair: Rinie Akkermans*
16:10	Effect of wall curvature on a round subsonic impinging jet: DNS study *Alessandro Salvagni, Domenico Borello, Jörn Sesterhenn*	Analysis of a dynamic wrinkling model for large eddy simulations of a turbulent premixed jet flame *Pedro S. Volpiani, Thomas Schmitt, Denis Veynante*	Dynamics of large-scale vortices in non-swirling and swirling jets. Measurements by tomographic PIV *Sergey Alekseenko, Sergey Abdurakipov, Vladimir Dulin, Mikhail Tokarev, Dmitriy Markovich*	An asymptotic-preserving and semi-implicit pressure-based compressible solver for flows at all Mach numbers *Thomas Roger, Vincent Moureau, Ghislain Lartigue*
16:30	VLES modelling of flow over walls with variably-shaped roughness by reference to complementary DNS *Suad Jakirlic, Benjamin Krumbein, Pourya Forooghi, Bettina Frohnapfel, Franco Magagnato*	Turbulent jet simulation using high-order DG methods for aeroacoustics analysis *Mathieu Lorteau, Marta de la Llave Plata, Vincent Couaillier*	Effective, one-dimensional description of an experimental pulsed detonation combustor *Mathias Lemke, J.A.T. Gray, Julius Reiss, J. P. Moeck, Jörn Sesterhenn*	Fully compressible channel flow simulations with a fluid close to its vapour-liquid critical point *Uttiya Sengupta, Bendiks Jan Boersma, Rene Pecnik*
16:50	Direct Numerical Simulation of the Interaction of a Wall-Attached Cube with a Turbulent Boundary Layer *Carlos Diaz Daniel, Sylvain Laizet, Christos Vassilicos*	Jet impingement onto a heated wall: A VLES study *Benjamin Krumbein, Suad Jakirlic, Cameron Tropea*	Mixing of Two Gas Streams at High Density Ratios - Experimental and Numerical Study *Benedikt Krohn, Medhat Sharabi, Bojan Niceno, Horst-Michael Prasser*	A Generalized Phase Average Representation of the Turbulent Wake behind a 2D Flat Plate *Robert Martinuzzi, David Wood, Phillip du Plessix, Meraj Mohebi*
17:10	High-order numerical study of cellular structures in the inert shocked gases of smoothly perturbed shock fronts *Guido Lodato, Luc Vervisch, Paul Clavin*	Numerical analysis of the side-jets formation in an externally modulated round jet. *Karol Wawrzak, Andrzej Boguslawski, Artur Tyliszczak*	-	Turbulence structure in front of a wall-mounted cylinder *Wolfgang Schanderl, Ulrich Jenssen, Michael Manhart*
17:30	-	Pulsed jets in laminar smooth and rough wall channel flows. *Nisat Anika, Lyazid Djenidi, Sedat Tardu*	-	Performance of Low-Order Standard Turbulence Models in Predicting Soot Emission from Ethylene Flame *Masoud Darbandi, Majid Ghafourizadeh, Sajjad Yousefian*
19:00-20:30	**Welcome Reception** Venue: Palazzo Sterri (University of Palermo)			

Thursday, 22 September

09:00-09:45	**Simone Hochgreb** (Cambridge) Understanding the structure and dynamics of turbulent reacting flows via selective experiments *Chair: Ananias Tomboulides | Room: Normanni*			
09:45-10:30	**Alfredo Pinelli** (City University of London) Flow manipulation based on passive and localised fluid structure interactions *Chair: Enrico Napoli | Room: Normanni*			
10:30-11:00	**Coffee Break**			
11:00-12:40	Room: Normanni	Room: Ruggero	Room: Angelica	Room: Basile
	Flames 1 *Chair: Luc Vervisch*	**Manipulated turbulence 1** *Chair: Stefan Hickel*	**High fidelity methods 1** *Chair: Richard Sandberg*	**Heat Transfer 1** *Chair: Karen Flack*
11:00	A comparison of strategies for direct numerical simulation of turbulence chemistry interaction in generic planar turbulent premixed flames *Markus Klein, Louis Dressler, Nilanjan Chakraborty, Chriss Stafford*	Plunging Airfoil: Leading Edge Vortex Manipulation by Plasma Actuators *Imdat Maden, Suad Jakirlic, Cameron Tropea, Jochen Kriegseis, Dennis Kütemeier, Robert Maduta*	Model-based near-wall reconstructions for Immersed Boundary methods *Elias Balaras, Michael Brown*	LES of heat transfer in an asymmetric rib-roughened duct: Influence of rotation *Domenico Borello, Franco Rispoli, Alessandro Salvagni, Kemal Hanjalic*
11:20	Extinction of swirl ethanol spray flames in a double-annulus bluff-body burner *Jenni Sidey, Patton Allison, Epaminondas Mastorakos*	Influence of drag reducing near-wall turbulence control on spectral properties of Reynolds shear stress *Alexander Stroh, Davide Gatti, Yosuke Hasegawa, Bettina Frohnapfel*	Comparison study of numerical codes for turbulent Rayleigh-Bénard convection *Gijs Kooij, Susanne Horn, Richard Stevens, Erwin van der Poel, Mike Botchev, Olga Shishkina, Detlef Lohse, Roberto Verzicco, Bernard Geurts*	Direct Simulation of Jet in Crossflow with conjugate heat transfer *Zhao Wu, Dominique Laurence, Imran Afgan*
11:40	Large eddy simulation of supersonic H2-O2 combustion *Umut Guven, Guillaume Ribert*	Characterisation of micro vortex generators effects on shock wave/turbulent boundary layer interaction using large eddy simulation *Arnaud Grebert, Julien Bodart, Stéphane Jamme, Laurent Joly*	Study of the numerical dissipation impact on the representation of freely decaying and wall-bounded turbulence for the Spectral Difference method *Jean-Baptiste Chapelier, Guido Lodato*	LES of Turbulent Conjugate Heat Transfer in Porous Media *Ryu Chikasue, Yusuke Kuwata, Kazuhiko Suga*
12:00	Stochastic Fields Method Applied to Turbulent Swirling Flames with Acoustic Perturbations *W P Jones, S Gallot Lavallee, F Biagioli, B Bunkute, K J Syed*	Turbulent duct flow with spanwise wall oscillations *Steffen Straub, Philipp Schlatter, Ricardo Vinuesa, Bettina Frohnapfel, Davide Gatti*	An Implicit Turbulence Model for Low Mach Roe Scheme Using Truncated Navier-Stokes Equations ChungGang Li, Makoto Tsubokura	Numerical study of flow and heat exchange in a pipe with partially wavy wall *Artur Tyliszczak, Mariusz Ksiezyk, Bernard Geurts*
12:20	Large eddy simulation of a turbulent swirling flame using the TFLES model coupled with a dynamic wrinkling formulation *Pedro S. Volpiani, Thomas Schmitt, Denis Veynante*	Amplitude effects of harmonic actuation on backward-facing step flow *Ruyun Hu, Song Fu*	RANS and eLES Simulations of Relaminarization *Pascal Bader, Wolfgang Sanz, Christoph Steinmayr, Peter Leitl*	Large Eddy Simulation of the Flow in Helical Heat Exchangers *Elia Merzari, Aleksandr Obabko, Paul Fischer, Haomin Yuan, Yiqi Yu*
12:40-14:00	**Lunch**			

Thursday, 22 September

14:00-15:40	Room: Normanni	Room: Ruggero	Room: Angelica	Room: Basile
	Heat transfer 2 *Chair: Bojan Niceno*	**Flames 2** *Chair: Andrzej Boguslawski*	**Manipulated turbulence 2** *Chair: Makoto Tsubokura*	**High-fidelity methods 2** *Chair: Domenico Borello*
14:00	LES of an impinging Heated Jet for a Small Nozzle-to-Plate Distance and high Reynolds Number *Pierre Grenson, Hugues Deniau, Bertrand Aupoix*	A priori Direct Numerical Simulation Assessment of Algebraic Flame Surface Density Models for Turbulent Flame-Wall Interaction in the context of Large Eddy Simulation *Jiawei Lai, Nilanjan Chakraborty, Markus Klein*	Flow over a Surface with Multiscale, Randomly Distributed Roughness *Pourya Forooghi, Alexander Stroh, Franco Magagnato, Benjamin Krumbein, suad Jakirlic, Bettina Frohnapfel*	High-fidelity CFD simulations of pulsed sieve-plate extraction columns *Zinedine Kkatir, Bruce Hanson, Michael Fairweather, Peter Heggs*
14:20	DNS of a heated turbulent pipe flow at high Prandtl numbers revisting the P-function model *Christoph Irrenfried, Helfried Steiner*	Modelling formation and initial propagation of flame kernels in turbulent non-premixed methane jets with LES/CMC *Huangwei Zhang, Andrea Giusti, Epaminondas Mastorakos*	Impact of multiscale cut-in trailing edge serrations on the wake of a lifting wing *Simon Prigent, Oliver Buxton, Paul Bruce*	Nek5000 LES Validation for Thermal-Hydraulics of Deformed Wire-Wrap Fuel Assembles *Aleksandr Obabko, Elia Merzari, Paul Fischer, Brian Jackson, Michael Steer*
14:40	Direct numerical simulation of thermal entrance region in combined turbulent pipe flow *Hirofumi Hattori, Masahide Inagaki, Tomoya Houra, Masato Tagawa*	Numerical investigation into the blow-off behaviour of swirling spray flames using the LES/CMC approach *Andrea Giusti, Epaminondas Mastorakos*	Recovery Process of Turbulent Magnetic Fluid Flow in Downstream of Magnetic Field Area *Takuma Tsukamoto, Masaaki Motozawa, Yasuo Kawaguchi, Mitsuhiro Fukuta*	On the simulation of the turbulent fluid-structure interaction within an array of tubes *Anthony Ponce, Thibaut Deloze, Alexandre Nicoli, Pierre Alvarez, Elisabeth Longatte, Marianna Braza, Yannick Hoarau*
15:00	Turbulent Entrainment in a Stable Stratified Fluid *Lilly Verso, Maarten van Reeuwijk,, Alex Liberzon*	Sparse-Lagrangian MMC modelling of a partially-premixed DME/air flame series *Gregor Neuber, Andreas Kronenburg, Oliver T. Stein, Jonas Kirchmann, Matthew J. Cleary*	The Contribution of Active and Inactive Structures to the Statistics of a Turbulent Pipe Flow *Fotos Stylianou, Stavros Kassinos*	Using DNS Data to Validate Pressure-Velocity Statistics Determined from Stereo-PIV Measurements *Robert Martinuzzi, David Wood, Arman Hemmati, Phillip du Plessix*
15:20	An Elliptic Blending Lag Model for Flows In Thermal-Hydraulics Systems *Ryan Tunstall, Sylvain Lardeau, Dominique Laurence, Robert Prosser*	Numerical Characterisation of Flow Field in a Rapid Compression Machine Using a Hybrid URANS-LES Method *Sajjad Yousefian, Nathan J. Quinlan, Henry J. Curran, Rory F. D. Monaghan*	Computational Modelling of the Flow and Heat Transfer in Dimpled Channels *Khalil Abo Amsha, Tim Craft, Hector Iacovides*	Large-eddy simulations of high Reynolds number jets with a suitable subgrid-scale model for solver dependency study *Matteo Angelino, Miguel A. Moratilla-Vega, Hao Xia, Gary J. Page*
15:40-16:10	**Coffee Break**			

Thursday, 22 September

16:10-17:50	Room: Normanni	Room: Ruggero	Room: Angelica	Room: Basile
	Turbulence Fundamentals *Chair: Ivette Rodriguez*	**Bluff body flow** *Chair: Bettina Frohnapfel*	**Phase transition** *Chair: Ari Glezer*	**Turbulence-reaction modeling** *Chair: Sutanu Sarkar*
16:10	Variational Multi-Scale Modeling of Tomographic PIV Results for Estimation of Turbulence Dissipation Rate Inside a Stirred Mixer *Chandra Shekhar*	Coupled Aerodynamic Control of the Turbulent Wake of a Moving Bluff Body *Thomas Lambert, Bojan Vukasinovic, Ari Glezer*	Large-eddy simulation of thin film evaporation and condensation from a hot plate in eclosure *Carlo Cintolesi, Andrea Petronio, Vincenzo Armenio*	Turbulent-chemical-reaction models: old and new; and which way forward? *Brian Spalding*
16:30	New results with turbulence models adapted for stress-strain lag and rotation/curvature effects in homogeneous incompressible flows *Alexandra Stefanescu*	Numerical acoustic analysis of a turbulent flow around a bluff body *Marta Cianferra, Sandro Ianniello, Vincenzo Armenio*	Predicting two-phase and subcooled boiling flows with a two-fluid CFD boiling model combined with a population balance approach *Marco Colombo, Michael Fairweather*	Modeling and simulations of turbulent dispersion of reactive scalars in complex urban areas *Sasa Kenjeres, Patrick Schrijvers, Corne Muilwijk*
16:50	Influence of zero-modes on the inertial-range anisotropy of Rayleigh-Taylor and unstably stratified homogeneous turbulence *Olivier Soulard, Benoît-Joseph Gréa*	Assessment of turbulence models for flow simulation around the Ahmed body *Emmanuel GUILMINEAU, Gan Bo DENG, Patrick QUEUTEY, Michel VISONNEAU*	A comparison of evaporation models for vapour bubbles in turbulent flow *Wiktor Michalek, Paolo Cifani, Giel Priems, Hans Kuerten, Cees van der Geld, Bernard Geurts*	A novel low emission combustor concept for gas turbine applications. *Jenni Sidey, Robert Gordon, Gilles Bourque, Epaminondas Mastorakos*
17:10	Turbulence Modelling in Aeroelastic Problems *Marcello Righi*	Experimental and numerical investigation of active flow control on a generic truck cabin *Guglielmo Minelli, Erwin Adi Hartono, Linus Hjelm, Valery Chernoray, Branislav Basara, Sinisa Krajnovic*	LES of Mixing and Condensation at Supercritical Pressures *Stefan Hickel*	Reduced chemical mechanisms for aviation fuels with RCCE *Panayiotis Koniavitis, William Jones, Stelios Rigopoulos*
17:30	Influence of vortex shedding in single- and multi-scale grid-generated turbulence *Gianfrancesco Melina, Paul Bruce, Christos Vassilicos*	Numerical investigation of the flow past a rotating golf ball and its comparison with a rotating smooth sphere *Jing Li, Makoto Tsubokura, Masaya Tsunoda*	Experimental investigation on the streamwise velocity fluctuation with the Reynolds-number dependence in turbulent viscoelastic-fluid flows *Shumpei Hara, Takahiro Tsukahara, Yasuo Kawaguchi*	Large-Eddy Simulation of a pulverized coal swirl burner *Dorian Midou, Luc Vervisch, Pascale Domingo*
19:00-22:00	**Conference Dinner** Venue: Villa Niscemi			

Thursday, 22 September

09:00-09:45	**Sutanu Sarkar** (UCSD) Turbulence at rough topography in the deep ocean *Chair: Vincenzo Armenio | Room: Normanni*			
09:45-10:30	**Detlef Lohse** (University of Twente) Turbulent Rayleigh-Benard and Taylor-Couette flow *Chair: Donatella Termini | Room: Normanni*			
10:30-11:00	**Coffee Break**			
11:00-12:40	Room: Normanni **Transition** *Chair: Artur Tyliszczak*	Room: Ruggero **Turbulence models** *Chair: Witold Elsner*	Room: Angelica **LES 1** *Chair: Arne Johansson*	Room: Basile **Noise and acoustics** *Chair: Dominic von Terzi*
11:00	On hypersonic boundary layer transition: role of streaks *Jie Ren, Song Fu*	Reappraisal of the constant C_epsilon_2 in the k-epsilon turbulence model *Lyazid Djenidi*	Assessment of subgrid-scale models for large-eddy simulation of complex flows *Franck Nicoud*	Noise prediction from a rotating cylinder in subcritical Reynolds flow *Leonidas Siozos-Rousoulis, Ghader Ghorbaniasl, Chris Lacor*
11:20	An algebraic model for prediction of bypass transition in turbomachinery boundary layer flows *Erik Dick, Slawomir Kubacki*	A Novel EARSM model for separated flows *Stephane Monte, Lionel Temmerman, Benoit Léonard, Benoît Tartinville, Charles Hirsch*	Adaptive LES modeling in the context of discontinuous finite elements methods *Jean-Baptiste Chapelier, Guido Lodato*	Overset LES for Trailing-Edge Noise Computations *Rinie Akkermans, Paul Bernicke, Roland Ewert, Juergen Dierke*
11:40	Laminar-turbulent transition in Hagen-Poiseuille flow of a real gas *Sergey Novopashin, Gennady Sukhinin, Petr Skovorodko*	The development of algebraic stress models using a novel evolutionary algorithm *Jack Weatheritt, Richard Sandberg*	Investigation of various wall modeling approaches for LES in the presence of mild pressure gradients *Olivier Thiry, Matthieu Duponcheel, Grégoire Winckelmans*	Far-field Noise Prediction of a Rod-airfoil Benchmark by IDDES and FW-H analogy *Wenqing Zhu, Zhixiang xiao*
12:00	An investigation of the transition prediction using KDO RANS model *Jinglei Xu, Ding Xu, Yang Zhang, Junqiang Bai*	Explicit algebraic Reynolds stress modelling of flows with large density variation *Igor Grigoriev, Stefan Wallin, Geert Brethouwer, Arne Johansson*	Improved Eddy-Viscosity Modelling of Wind Turbine Wake Interactions *Sasa Kenjeres, Joep Hennen*	A Numerical Study on the Sound Absorption Mechanism of A Non-Locally Reacting Liner under High SPL *Chao Chen, Xiaodong Li, Frank Thiele*
12:20	Further assessment of the grey-area enhanced sigma-DES approach for complex flows *Marian Fuchs, Charles Mockett, Jörn Sesterhenn, Frank Thiele*	A numerically robust Reynolds stress model for improved prediction of practically relevant separating flow applications *Robert Maduta, Suad Jakirlic*	Dynamic global-coefficient procedures for wall-adapting subgrid-scale models *Shahriar Mohammadi, Romuald Skoda*	Direct Numerical Simulation of a Helmholtz resonator excited by a low Mach number turbulent flow *Lewin Stein*
12:40-14:00	**Lunch**			

Thursday, 22 September

14:00-15:40	Room: Normanni	Room: Ruggero	Room: Angelica	Room: Basile
	EUROTURBO *Chair: Francesco Martelli*	**LES 2** *Chair: Franck Nicoud*	**Friction and drag** *Chair: Mikhail Strelets*	**Separated flow** *Chair: Sergey Novopashin*
14:00	Numerical investigation of the suction side laminar separation bubble for a highlift low pressure turbine blade at low Reynyolds numbers *Fabio Bigoni, Stefano Vagnoli, Tony Arts, Tom Verstraete*	Resolved Large Eddy Simulation of Turbulence over Anisotropic Porous Media *Yusuke Kuwata, Suga Kazuhiko*	Skin friction reduction in fully developed turbulent channel flow based on DNS and adjoint shape optimization *Thomas Köthe, Claus Wagner*	Simulation of flow with massive separation using open-source code *Ahmad Fakhari, Andrea Petronio, Vincenzo Armenio, Roberta Padovan*
14:20	Large Eddy simulations of a rotating ribbed channel at high rotation numbers *Ignacio Mayo, Tony Arts, Laurent Gicquel*	Large-Eddy and Direct Numerical Simulations of the Bachalo-Johnson bump flow with shock-induced separation *Philippe Spalart, Kirill Belyaev, Andrey Garbaruk, Michael Shur, Michael Strelets, Andrey Travin*	A Reynolds stress model for drag-reducing viscoelastic turbulent flow *Shun Inoue, Takahiro Tsukahara, Suad Jakirlić, Yasuo Kawaguchi*	Budgets of temperature fluctuations in buoyancy-affected turbulent backward-facing step flows at low Prandtl number *Martin Niemann, Jochen Fröhlich*
14:40	Turbulence production, dissipation and time scales in laminar separation bubbles *Daniele Simoni, Davide Lengani, Marina Ubaldi, Pietro Zunino, Roberto Guida*	Framework for Buoyancy-Driven Flows using Large Eddy Simulations *Kiran Bhaganagar, Manjure Nayamatullah, Pavan Rao*	Direct Numerical Simulation for Drag Reduction on a Rough Wall with Uniform Blowing *Eisuke Mori, Maurizio Quadrio, Koji Fukagata*	Cubic turbulence closures and dispersion models for flows around different configurations of ground-mounted buildings *Riccardo Longo, Alessandro Parente, Marco Ferrarotti*
15:00	Comparison of Measured and Computational Turbulence Data in a Two-Stage Two-Spool Turbine Test Rig *Sabine Bauinger, Pascal Bader, Emil Göttlich, Wolfgang Sanz, Franz Heitmeir*	Cylinder wall junction flow: Particle Image Velocimetry and Large Eddy Simulation *Ulrich Jenssen, Wolfgang Schanderl, Michael Manhart*	History effects and near-equilibrium in turbulent boundary layers with pressure gradient *Alexandra Bobke, Ricardo Vinuesa, Ramis Örlü, Philipp Schlatter*	Investigations on the flow past a wall-mounted hemisphere based on LES and synthetically generated turbulence *Guillaume De Nayer, Stephan Schmidt, Jens Nikolas Wood, Michael Breuer*
15:20	A geometric multi-grid framework for the extraction of the large-scale vortices in turbulent flows. Application to the massively parallel LES of a low-Mach number turbine blade *Nicolas Legrand, Ghislain Lartigue, Vincent Moureau*	Detached-Eddy Simulation of flow past a pitching NACA 0015 airfoil *Liang Wang, Song Fu, Liying Li*	The effect of turbulence intensity on the wake of a wall-mounted cube in a turbulent boundary layer *R. Jason Hearst, Guillaume Gomit, Bharathram Ganapathisubramani*	-
15:40-16:00	**Closing address - Announcing ETMM12** *Chair: Bernard Geurts | Room: Normanni*			

Keynote Speakers

Karen A. Flack

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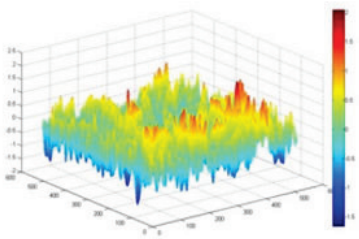
United States Naval Academy

Karen A. Flack is a Professor and Chair of the Mechanical Engineering Department at the United States Naval Academy in Annapolis, Maryland, USA. Her research focuses on turbulent boundary layer physics with a concentration on rough wall boundary layers and frictional drag prediction.

Flack graduated from the University of California at Berkeley in 1989 and completed her PhD at Stanford University in Mechanical Engineering in 1993. She holds her chair at the U.S. Naval Academy since 2004.

Title: The relationship between surface topography and frictional drag

Abstract: Understanding the relationship between a surface's topography and its hydraulic resistance is an important, yet illusive, goal in fluids engineering. Particularly poorly understood are the flow conditions at which a given surface will begin to show the effects of roughness in the form of increased wall shear stress above that of the hydraulically smooth wall and the behavior of frictional drag in the transitionally rough regime. The goal of this research is to develop engineering correlations for the prediction of frictional drag for all roughness regimes. The correlations should be based on information that can be obtained solely from the surface topography, thus excluding any information that requires hydrodynamic testing. Previous results have shown that the root-mean-square roughness height (krms) and the skewness (Sk) of the probability density function are the roughness scales that best predict frictional drag in the fully rough regime. These and other statistics for a wide range of surfaces are investigated in the transitionally rough regime. Results will be presented for systematically altered surface roughness with a range of scales that follow a power law spectrum.



Mathematically generated rough surface with a range of scales

Vladimir Nikora

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University of Aberdeen

Professor Vladimir Nikora is the Sixth Century Chair in Environmental Fluid Mechanics at the School of Engineering, University of Aberdeen, UK. Before coming to Scotland in February 2006, he was Principal Scientist and Manager of the Hydrodynamics Group at the National Institute of Water and Atmospheric Research in New Zealand that he joined in 1995. Dr. Nikora's main research accomplishments relate to improved understanding of stream turbulence, development and applications of the double-averaging methodology for describing and predicting rough-bed turbulent flows, new sediment dynamics concepts related to erosion and transport of cohesive and non-cohesive sediments, new concepts of flow-biota interactions including those for periphyton, mosses, vascular plants, mussels, and fish communities. Vladimir Nikora is Fellow of the Royal Society of Edinburgh, Editor of IAHR Journal of Hydraulic Research, and a recipient of 2010 Hunter Rouse Hydraulic Engineering Award of the American Society of Civil Engineers that "recognizes outstanding contributions to hydraulics and waterways".

Title: Turbulence in open-channel flows: recent advances and implications for sediment transport, hydraulic resistance and flow-biota interactions

Abstract: Open-channel flow (OCF, e.g., streams and rivers) occupies a special place in a family of turbulent flows. It may exhibit a set of properties that make this flow unique and exciting, i.e.: (1) flow boundaries (sedimentary bed and free surface) can be highly 'deformable' and dynamic, constantly changing in response to varying flow; (2) channel surface may exhibit a complex hierarchical structure covering scales spanning 7-10 orders of magnitude; (3) aquatic biota may significantly influence flow and its boundaries; and (4) flow submergence (i.e., ratio of the flow depth to the height of prevailing roughness elements such as sediment particles, their clusters, bedforms, or benthic organisms) may be as low as 1-4.

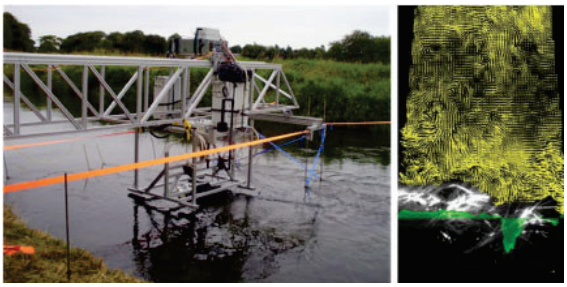

Figure 1. Left: deployment of the Aberdeen Field PIV System in the Urie River, Scotland. Right: flow filed around a moving plant Ranununculus where the plant is shown in gray, plant vertical velocity in green, and flow velocity field in yellow. Full details are in Cameron, Nikora, Albayrak, Miler, Stewart, Siniscalchi, Journal of Fluid Mechanics, 2013, 732, 345-372.

This talk will highlight the key features of OCF turbulence and briefly review similarities with other flow types such as boundary layers, pipes and closed channels. Then, the latest advances in studies of OCF turbulence will be discussed, including turbulence statistics and coherent motions, with particular focus on 'superstructures' (or 'very large scale motions' up to 40-50 flow depths in length) and their potential relation to OCF secondary flows. This will be followed by consideration of turbulence effects in sediment transport, flow-biota interactions, and hydraulic resistance.

Among other findings, it will be shown that particle entrainments on the channel beds are likely associated with interactions between flow superstructures (i.e., 'collisions' of superstructures, 'meandering' across the flow, generate regions of a particular velocity pattern leading to the particle entrainment). Effects of aquatic biota on the OCF turbulence will be illustrated using aquatic vegetation as an example (Fig. 1), considering interactions at multiple scales, from the leaf scale to the plant patch mosaic scale comparable to the flow width. Finally, a theoretical approach for quantifying key contributors to the OCF friction factor will be outlined and its applications will be illustrated for fixed-bed and mobile-bed conditions.

Simone Hochgreb

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University of Cambridge

Simone Hochgreb is Professor of Combustion at the Univ of Cambridge. She has developed measurement methods for reacting flows for autoignition, spray, soot and coal combustion in a range of devices. Her current work is in the application of optical diagnostics to understanding turbulent flames, combustion instabilities, pollutant emissions and flame synthesis. Prior to Cambridge she held positions at MIT and Sandia National Labs. She is a Fellow of the Royal Aeronautical Society, and has received the Wolfson Merit Award and the Society of Automotive Engineers Ralph R. Teetor Award.

Title: Understanding the structure and dynamics of turbulent reacting flows via selective experiments

Abstract: Predictions about the evolution of turbulent reacting and non-reacting flows approach increasingly fidelity at the largest scales via LES, and smallest via DNS. There is still a battle in the middle ground, for which models must be proposed and validated. Although quasi-DNS calculations continue to be demonstrated, we are still far from a one size fits all approach to modelling turbulent reacting flows. Sensible but not necessarily thoroughly validated models abound as the fill in the spaces left between the grid size and the scales of interest. In particular, mixing and reactions necessarily take place at the molecular level, and require special tools for understanding the interaction between models and experiments. In this talk, we examine the structure of turbulent premixed flames, what the models and measurements say about them, and where experiments and models are trying to meet. In particular, we discuss a recent series of experiments on stratified flames as an illustration of the current progress and some surprises.

Alfredo Pinelli

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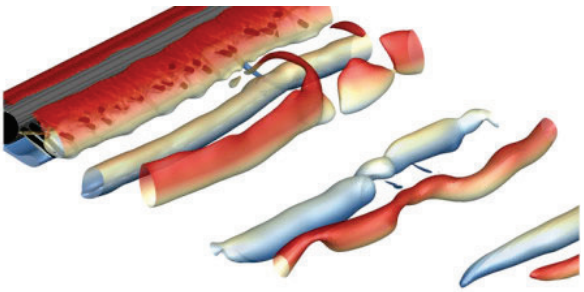
City University London

Alfredo Pinelli is professor of Fluid Simulation at the School of Engineering and Mathematical Sciences at City University London (CU). Since 1989 he has worked actively in the field of Direct and Large Eddy Simulations of turbulent flows, covering both physical and algorithmic aspects. Lately, he has widened his research interests to the simulation of fluid flows around complex geometries including fluid-structure interaction problems with particular emphasis on biomimetic flow control methodologies. All the mentioned subjects are covered by his publications record that includes about 70 peer reviewed papers and 60 international conferences. Alfredo Pinelli has participated in several National, European and International research projects.

Title: Flow manipulation based on passive and localised fluid structure interactions

Abstract: Surfaces covered by arrayed, slender, deformable, filamentous structures, anchored to a substrate and exposed to viscous flows are ubiquitous in nature, and increasingly seen in bio inspired technology. During this talk, two examples will be explored and discussed in details. The first one concerns the possibility of manipulating a bluff body wake using an array of elastic, slender filaments appended on its lee side. The second one, inspired by the feathers pop up frequently observed in manoeuvring birds, will focus on the use of thin flexible flap-like membrane mounted on the suction side of aerofoils to palliate the effects of sudden changes of incidence angle. Finally, some preliminary results on the behavior of a turbulent flow developing over a flat plate covered by a dense elastic filamentous carpet where a self-similar solution at the interface may take place will be introduced and discussed.



Iso-surfaces of Q, colored with the distance from the mid-plane. ReD=200 corresponding to the first three-dimensional bifurcation (i.e. A mode). Filaments on the lee side are spaced D/4 apart. Filaments natural frequency has been randomly chosen in the range of 0.2 to 5 fs (Karman's undisturbed shedding frequency).

Sutanu Sarkar

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University of California at San Diego

Sutanu Sarkar received his B. Tech from IIT Bombay, M. S. from Ohio State University and Ph. D. from Cornell University. After 4 years as a staff scientist at ICASE, NASA Langley Research Center, he joined UCSD where he is currently the Blasker Professor of Engineering. He has broad interests in turbulence simulation and modeling and has worked in problems concerning the environment, energy, aerospace and propulsion. His current research interests are routes to turbulence and mixing in the ocean, wakes and boundary layers in the natural environment, and renewable energy. He has received a NASA group achievement award (1994), the Bessel Award from the Humboldt Foundation (2001), and was elected Fellow, American Physical Society (2006), Associate Fellow, AIAA (2009) and Fellow, ASME (2010).

Title: Turbulence at rough topography in the deep ocean

Abstract: Turbulence is essential to maintain the observed stratification in the abyssal ocean and also strongly impacts the biogeochemical state of the ocean. Tidal flow over rough topography in the deep ocean generates internal gravity waves with a fraction of the wave energy breaking down into local turbulence at the generation site and the remainder radiating away to fuel remote turbulence. We have performed high-resolution simulations to examine nonlinear processes and turbulence in two model generation sites: a triangular ridge and a multiscale rough obstacle that is patterned after realistic topography in Luzon Strait. Different flow features are found to be responsible for transition to turbulence at different spatial locations and lead to energetic turbulence at different phases of the oscillating tide. I will discuss how the local dissipation of energy depends on environmental forcing and topography parameters.

Detlef Lohse

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University of Twente

Detlef Lohse is Professor and Chair of the Physics of Fluids group at the University of Twente, The Netherlands. His research focuses on multiphase flow from an experimental and theoretical perspective with research addressing microscopic as well as macroscopic scales.

Lohse graduated from the University of Bonn in 1989 with a degree in Physics, and completed his PhD at the University of Marburg in 1992. He served as a postdoctural research fellow at the University of Chicago from 1993 to 1995, and was finally made chair of Physics of Fluids at the University of Twente in 1998.

Title: Turbulent Rayleigh-Benard and Taylor-Couette flow

Abstract: Rayleigh-Benard flow — the flow in a box heated from below and cooled from above — and Taylor-Couette flow -- the flow between two coaxial co- or counter-rotating cylinders -- are the two paradigmatic systems in physics of fluids and many new concepts have been tested with them. They are mathematically well described, namely by the Navier-Stokes equations and the respective boundary conditions.

While the low Reynolds number regime (i.e., weakly driven systems) has been very well explored in the '80s and '90s of the last century, in the fully turbulent regime major research activity only developed in the last decade. This was also possible thanks to the advancement of computational power and improved algorithms and nowadays numerical simulations of such systems can even be done in the so-called ultimate regime of turbulence, in which even the boundary layers become turbulent. In this talk we review this recent progress in our understanding of fully developed Rayleigh-Benard and Taylor-Couette turbulence, from the experimental, theoretical, and numerical point of view. We will explain the parameter dependences of the global transport properties of the flow and the local flow organisation, including velocity profiles and boundary layers, which are closely connected to the global properties. Next, we will discuss transitions between different (turbulent) flow states.

This is joint work with many colleagues over the years, and I in particular would like to name Siegfried Grossmann, Roberto Verzicco, Richard Stevens, Erwin van der Poel, and Rodolfo Ostilla-Monico.