



**1st Workshop on Machine Learning for Fluid Dynamics
PARIS-Sorbonne University**

Location: CICSU (Sorbonne Université, Jussieu Campus, Centre International de Conférences de Sorbonne Université), Tower 44

Thursday, 7 th March 2024		
08:50	Opening room: 1st Floor, Room 108	
09:00	Nils Tuerey, TU Munich, Germany <i>"Unifying Forces: Towards the Convergence of Numerical Simulations and Machine Learning"</i>	
	Room: 108	Room: 106
	Chair: N. Thuerey	Chair: G. Rigas
09:45	Flow Field Compression In Recurrence Based Fast CFD Simulations Stefan Puttinger Johannes Kepler University Linz, Austria	Deep Reinforcement Learning for the Management of the Wall Regeneration Cycle in Wall Bounded Turbulent Flows Giorgio M Cavallazzi, Alfredo Pinelli, Mohammad Omidyeganeh City, University of London, United Kingdom
10:00	A CFD-based Surrogate Modeling Approach For Pedestrian Wind Comfort Assessment Sampath Kumar Raghunathan Srikumar, Gabriele Mosca, Alessandro Gambale, Alessandro Parente BuildWind SRL, Brussels, Belgium; École polytechnique de Bruxelles, Université Libre de Bruxelles, Belgium; Brussels Institute for Thermal-fluid systems and clean Energy (BRITE), ULB and VUB, Belgium	Control of Three-Dimensional Rayleigh Bénard Convection (RBC) using Multi-Agent Reinforcement Learning (MARL) Joel Vasanth, Jean Rabault, Francisco Alcántara Áliva, Mikael Mortenson, Ricardo Vinuesa KTH Royal Institute of Technology, Sweden
10:15	Graph Neural Networks: a Possible Surrogate Model for Multiphase Flow - a Brief Review Mosayeb Shams, Omar K. Matar Imperial College London, United Kingdom	Towards Practical Applications of Deep Reinforcement Learning in Computational Fluid Dynamics Saeed Salehi, Hakan Nilsson Chalmers University of Technology, Sweden; Chalmers Industriteknik, Gothenburg, Sweden
10:30	Assessment of Deep Learning Neural Networks for Flow Field Reconstruction Ethan Yew Hoe Wong, Y. Duan, M. D. Eaton, M. J. Bluck Imperial College London, United Kingdom	Reinforcement Learning of Active Flow Control in Partially Observable Environments Max Weissenbacher, Anastasia Borovykh, Georgios Rigas Imperial College London, United Kingdom
10:45	Multi-Scale Rotation-Equivariant Graph Neural Networks for Unsteady Eulerian Fluid Dynamics Mario Lino, Stathi Fotiadis, Anil A. Bharath, Chris Cantwell Technical University of Munich, Germany; Imperial College London, United Kingdom	Deep Reinforcement Learning for Turbulent Drag Reduction at Moderate Reynolds Numbers Luca Guastoni, Jean Rabault, Hossein Azizpour, Ricardo Vinuesa KTH Royal Inst. of Tech., Stockholm, Sweden
11:00	Coffee break: Room 102	



1st Workshop on Machine Learning for Fluid Dynamics PARIS-Sorbonne University

Location: CICSU (Sorbonne Université, Jussieu Campus, Centre International de Conférences de Sorbonne Université), Tower 44

Thursday, 7th March 2024

		Room: 108	Room: 106
		Chair: I. Mortazavi	O. Lehmkhul
11:30		<p>Deep Learning for Aerodynamics: An Overview of Neural Network based Surrogate Modeling Capabilities of DLR SMARTY</p> <p>Mateus Dias Ribeiro, Simon Wassing, Derrick Hines Chaves, Philipp Bekemeyer</p> <p>DLR Institute for Aerodynamics and Flow Technology, Braunschweig, Germany</p>	<p>Sample Efficient Fluid Flow Control Using Neuroevolution Guided Deep Reinforcement Learning</p> <p>Sing Tarun, Laurent Cordier, Ronan Fablet</p> <p>Institut Pprime, CNRS – Université de Poitiers – ISAE-ENSMA, UPR 3346, 86962 Futuroscope, France</p>
11:45		<p>Spatial Implicit Neural Representation for the Transonic Aerodynamics over an Airfoil</p> <p>Giovanni Catalani, Michael Bauerheim, Joseph Morlier</p> <p>ISAE-Supaero, Toulouse; Airbus Operation, Toulouse, France</p>	<p>Deep Learning of Turbulent Topologies</p> <p>Dimitris Drikakis, Filippos Sofos, Ioannis W. Kokkinakis</p> <p>University of Nicosia, Cyprus</p>
12:00		<p>Data-Driven Reduced Order Models For Partitioned Fluid-Structure Interactions</p> <p>Azzedine Tiba, Thibault Dairay, Florian De Vuyst, Iraj Mortazavi, Juan-Pedro Berro Ramirez</p> <p>M2N, CNAM</p>	<p>Coupling Machine Learning Local Predictions with A Computational Fluid Dynamics Solver to Accelerate Transient Buoyant Plume Simulations</p> <p>Clément Caron, Philippe Lauret, Alain Bastide</p> <p>University of Reunion, France; INTEGRALE Ingenierie, La Reunion, France</p>
12:15		<p>A Deep Neural Network Framework for Fast Predicting Aerodynamic Loads of Pitching Aerofoils Incurring in Dynamic Stall</p> <p>Giacomo Baldan, Alberto Guardone</p> <p>Politecnico di Milano, Italy</p>	<p>Learning Corrections of Discontinuous Galerkin Schemes</p> <p>Anna Kiener, Florent Renac</p> <p>German Aerospace Center (DLR), Germany</p>
12:30		<p>Non-intrusive Reduced Order Methods in CFD Enhanced by Machine Learning</p> <p>Gianluigi Rozza</p> <p>International School of Advanced Studies, SISSA, Mathematics, mathLab, Trieste, Italy</p>	<p>First-Principle-Like Reinforcement Learning of Nonlinear Numerical Schemes for Conservation Laws</p> <p>Haochen Wang, Meilin Yu, Heng Xiao</p> <p>Stuttgart Center for Simulation Science (SC SimTech), University of Stuttgart, Germany</p>
12:45	Lunch: Room 102		



**1st Workshop on Machine Learning for Fluid Dynamics
PARIS-Sorbonne University**

**Location: CICSU (Sorbonne Université, Jussieu Campus, Centre
International de Conférences de Sorbonne Université), Tower 44**

Thursday, 7th March 2024 - Afternoon	
14:00	<p>Heinz Pitsch, RWTH Aachen University, Germany</p> <p><i>“Advancing Turbulent Combustion Modeling for Future Renewable Fuels: Unveiling the potential of super-resolution generative adversarial networks”</i></p> <p>Room: 108</p>
	<p>Room: 108</p> <p>Chair: L. Magri</p>
	<p>Room: 106</p> <p>Chair: A. Attili</p>
14:45	<p>MZ-AE: A Mori-Zwanzig approach for Koopman closure using Non-Linear Autoencoders</p> <p>Priyam Gupta, Peter J. Schmid, Denis Sipp, Taraneh Sayadi, Georgios Rigas</p> <p>Imperial College London, United Kingdom</p>
	<p>A Data-Enhanced Partially Stirred Reactor Closure for a Progress Variable Approach in Partially Premixed Enclosed Flames</p> <p>Salvatore Iavarone, Arthur Péquin, James C. Massey, Hanying Yang, Nedunchezian Swaminathan, Alessandro Parente</p> <p>Université Libre de Bruxelles, École Polytechnique de Bruxelles, Belgium; Brussels Institute for Brussels Thermal Energy (BRITE), ULB and VUB, Belgium</p>
15:00	<p>Hybrid Autoencoder/Galerkin Approach for Nonlinear Reduced Order Modelling</p> <p>Nicolas Lepage, Samir Beneddine, Camilla Fiorini, Iraj Mortazavi, Denis Sipp, Nicolas Thome</p> <p>Conservatoire National des Arts et Metiers, M2N, Paris, France</p>
	<p>Extrapolation Performance of CNN for Combustion LES Models: Effect of Reynolds Number and Filter Size</p> <p>Geveen Arumapperuma, Matthew Jensen, Nicola Sorace, Oliver Bladek, Ludovico Nista, Heinz Pitsch, Temistocle Grenga, Antonio Attili</p> <p>University of Edinburgh, United Kingdom</p>
15:15	<p>Learning the Latent Dynamics of Turbulent Kolmogorov Flow</p> <p>Elise Özalp, Luca Magri</p> <p>Imperial College London, United Kingdom</p>
	<p>Multi-fidelity digital twins for ammonia combustion: impact of low-fidelity data quantity on prediction accuracy</p> <p>Aysu Ozden, M. Savarese, L. Giuntini, A. Procacci, R. Malpica Galassi, A. Coussement, F. Contino, Alessandro Parente</p> <p>Universite Libre de Bruxelles, Belgium; Brussels Institute for Brussels Thermal Energy (BRITE), ULB and VUB, Belgium; UC Louvain, Louvain-la-Neuve, Belgium</p>
15:30	<p>Reduced-Order Modelling Of Dynamo Waves</p> <p>Anna Guseva, Calum Skene, Steven Tobias</p> <p>LERMA, Paris Observatory, France</p>
	<p>Artificial Neural Networks for Combustion Chemistry Integration</p> <p>Weitao Liu, Andreas Kronenburg, Thorsten Zirwes</p> <p>Universität Stuttgart, Germany</p>
15:45	<p>Forecasting in Fluid Dynamics Through Hybrid Reduced Order Models</p> <p>Arindam Sengupta, R. Abadia-Heredia, A. Corrochano, J. Garicano-Mena, S. Le Clainche</p> <p>Universidad Politécnica de Madrid, Spain</p>
	<p>Toward a Reduced Order Model of Lean H2 Flames Using Experimental and Numerical Data</p> <p>Nicole Junqueira, Luís Fernando Figueira da Silva, Valéry Morgenthaler</p> <p>Ansys France; Institut Pprime, CNRS, ISAE-ENSMA and Université ; de Poitiers, France</p>
16:00	<p>Coffee break: Room 102</p>



1st Workshop on Machine Learning for Fluid Dynamics PARIS-Sorbonne University

Location: CICSU (Sorbonne Université, Jussieu Campus, Centre International de Conférences de Sorbonne Université), Tower 44

Thursday, 7th March 2024

Room: 108		Room: 106
Chair N. Ashton		Chair H. Pitsch
16:30	<p>Open-Source Machine Learning Training Dataset for the Windsor Body Using High-Fidelity Cartesian Immersed Boundary WMLES</p> <p>Neil Ashton, A. Walle, Jordan B. Angel, Aditya S. Ghatge, Gaetan K. W. Kenway, Man Long Wong, Cetin C. Kiris</p> <p>Amazon Web Services, United Kingdom</p>	<p>Predicting the Flame Transfer Functions by Transfer Learning of Empirical Models</p> <p>Yazhou Shen, Aimee S. Morgans</p> <p>Imperial College London, United Kingdom</p>
16:45	<p>An Experimental Database for Machine Learning of Algebraic Models in Separated Flows</p> <p>Andrea Carlucci, Matteo Dellacasagrande, Davide Lengani, Daniele Petronio, Daniele Simoni</p> <p>Università degli Studi di Genova, Italy</p>	<p>PCA and K-Means Clustering of Fuel-Air Mixing in Gas Turbine Combustors</p> <p>David Salvador-Jasin, Duncan Walker, Jon Carrotte</p> <p>Loughborough University, United Kingdom; Research Engineering Group, The Alan Turing Institute, London, United Kingdom</p>
17:00	<p>High-Fidelity, Open-Source Training Dataset for Machine Learning in Automotive External Aerodynamics</p> <p>Charlie Mockett, N. Ashton, L. Fliessbach, M. Fuchs, H. Hetmann, T. Knacke, N. Schönwald, V. Skaperdas, A. Walle</p> <p>Upstream CFD GmbH, Germany</p>	<p>Super-Resolution Reconstruction of Turbulent Velocity and Scalar Fields Using CycleGAN</p> <p>Ali Shamooni, Ruyue Cheng, Oliver T. Stein, Andreas Kronenburg</p> <p>University of Stuttgart, Germany</p>
17:15	<p>Prior Learning for Sparse View Tomography: Application to a Simulated Unsteady Hot Jet</p> <p>Frederic Champagnat, Philippe Cornic, Olivier Léon, David Donjat</p> <p>ONERA/DTIS, Paris Saclay, France</p>	<p>A Data-Driven Approach to Correct the Cell Reacting Fraction in the Partially Stirred Reactor Closure for Premixed Flames</p> <p>Lorenzo Piu, Arthur Péquin, Rodolfo Freitas, Salvatore Iavarone, Heinz Pitsch, Alessandro Parente</p> <p>Université Libre de Bruxelles, École Polytechnique de Bruxelles, Aero-Thermo-Mechanics Laboratory, Belgium; Brussels Institute for Brussels Thermal Energy (BRITE), ULB and VUB, Belgium</p>
17:30	<p>Transfer Learning for Handling Experimental Uncertainty in Mean Flow Reconstruction for Physics-Informed Neural Networks</p> <p>Christian Toma, Bharath Ganapathisubramani, Sean Symon</p> <p>University of Southampton, United Kingdom</p>	<p>Development of Data-Driven Models for Reactive Systems using Neural Network</p> <p>Mohsen Gharib, Philip Rößger, Andreas Richter</p> <p>Fraunhofer Institute for Ceramic Technologies and Systems, Dresden, Germany</p>
19:00	<p>Social Dinner (Péniche tour on the Sein with cocktail)</p>	