



FrontUQ19

Workshop on Frontiers of
Uncertainty Quantification in Fluid Dynamics

Pisa (Italy) – 11-13 September 2019

Scientific Program

Sponsors



Università di Pisa



ERCOFTAC



GAMM-UQ
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- Ibrahim Hoteit – King Abdullah University of Science and Technology, Saudi Arabia
- Adrian Kelsey – HSE, United Kingdom
- Omar Knio – King Abdullah University of Science and Technology, Saudi Arabia

FrontUQ19 -Detailed program

Wednesday September 11, 2019

8.30-9.00	Registration
9.00-9.10	Welcome and opening
9.10-10.00	Keynote Lecture - G. Iaccarino - UQ & HPC: towards exascale ensemble simulations <i>Session Chair: M.V. Salvetti</i> <i>Auditorium</i>
10.00-11.00	SW1 – Turbulence I <i>Session Chair: G. Iaccarino</i> <i>Auditorium</i>
10.00-10.20	<u>A. von Korlaar</u> , R.P. Dwight - Bayesian field-inversion for turbulence anisotropy with informative priors
10.20-10.40	<u>A. D. Scillitoe</u> - Using Machine learning to predict and understand turbulence modelling uncertainties
10.40-11.00	<u>M. Meldi</u> - State Estimation for wall-bounded turbulent flows using the Immersed Boundary Method and Data Assimilation
11.00-11.30	Coffee Break
11.30-12.50	SW2 – Turbulence II <i>Session Chair: R. Dwight</i> <i>Auditorium</i>
11.30-11.50	<u>Y. Zhang</u> , R.P. Dwight, J.F. Gómez - Enhancing RANS with LES for variable-fidelity optimization
11.50-12.10	<u>B. Rocchio</u> , A. Mariotti, M.V. Salvetti - Stochastic analysis of the effect of modeling, numerical and geometrical parameters in large-eddy simulations of the flow around a 5:1 rectangular cylinder
12.10-12.30	<u>S. Rezaeiravesh</u> , R. Vinuesa, P. Schlatter - Numerical uncertainties in scale-resolving simulations of wall turbulence
12.30-12.50	<u>F. Bernardoni</u> , U. Ciri, M.V. Salvetti, S. Leonardi - Stochastic approach for the evaluation of aerodynamic flow over irregular rough walls
12.50-14.30	Lunch break
14.30-15.20	Keynote Lecture - S. Mishra - UQ for nonlinear hyperbolic PDEs with statistical solutions <i>Session Chair: L. Tamellini</i> <i>Auditorium</i>
15.20-16.20	SW3 – Methodology I <i>Session Chair: L. Tamellini</i> <i>Auditorium</i>
15.20-15.40	<u>L. van den Bos</u> , B. Sande - Iterative construction of quadrature rules for Bayesian prediction
15.40-16.00	<u>C. Müller</u> , J. Lang - A stochastic Galerkin reduced basis method for parametrized convection-diffusion-reaction equations based on adaptive snapshots
16.00-16.20	<u>N. Pepper</u> , F. Montomoli, S. Sharma - Multiscale uncertainty quantification with arbitrary polynomial chaos
16.20-16.50	Coffee Break

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16.50-17.50	SW4 – Methodology II <i>Session Chair: S. Mishra</i> <i>Auditorium</i>
16.50-17.10	<u>C. F. Silva</u> , P. Bonnaire, S. Schuster, P. Pettersson - Intrusive generalized polynomial chaos for the solution of the unsteady Navier-Stokes equations
17.10-17.30	<u>R. Zamolo</u> , L. Parussini - RBF-FD meshless solver to investigate the propagation of geometric uncertainty in laminar flows
17.30-17.50	<u>R. Sawko</u> , Małgorzata J. Zimoń, Alex Skillen - Wavelet-assisted multi-element polynomial collocation method
17.50-18.35	SW5 – Poster short presentations <i>Session Chair: M.V. Salvetti</i> <i>Auditorium</i>
17.50-17.55	F. Municchi, <u>J. Couch</u> , and M. Icardi - Multi-continuum models for conjugate transport in random heterogeneous media and application to molecular communication
17.55-18.00	<u>A. Bevilacqua</u> , M. de Michieli Vitturi, T. Esposti Ongaro, A. Neri - Enhancing the uncertainty quantification of pyroclastic density current dynamics in the Campi Flegrei caldera
18.00-18.05	<u>J. Parekh</u> , R. Verstappen - Intrusive polynomial chaos for CFD using OpenFOAM
18.05-18.10	<u>T. Mühlpfordt</u> , V. Hagenmeyer, T. Faulwasser - PolyChaos.jl – Toward an open source julia package for polynomial chaos expansion
18.10-18.15	<u>P. Chandramouli</u> , E. Memin - Stochastic fluid flow model to quantify the contribution of small-scale inhomogeneity to large-scale flow structuration
18.15-18.20	<u>C.Y. Wong</u> , P. Seshadri, G. Parks - Embedded ridge approximation: ideas and algorithms in vector-valued dimension reduction
18.20-18.25	<u>S. Riisøen</u> , F. Iversen - Experimental investigation of the accuracy of the modelled frictional pressure loss for annular pipe flow based on rheological characterization of a non-Newtonian drilling fluid
18.25 -18.30	<u>S.A. Aasaa</u> , T.C Jen, R.S. Fono-Tamo - Convective heat enhancement uncertainties of pressure and temperature data acquisition in rectangular channel
18.30-18.35	T.C Jen, <u>S.A. Aasaa</u> , R.S. Fono-Tamo - Uncertainty characteristic of friction factors and Nusselt Number in heat enhancement rectangular channel
18.35-20.30	Visit to posters and welcome cocktail

Thursday September 12, 2019

9.00-9.50	Keynote Lecture - G. Karniadakis - Physics-informed neural networks (PINNs) with uncertainty quantification <i>Session Chair: D. Lucor</i> <i>Auditorium</i>	
9.50-11.10	ST1 – Methodology III <i>Session Chair: G. Karniadakis</i> <i>Auditorium</i>	ST2 – Applications I <i>Session Chair: A. Mariotti</i> <i>Room B</i>
9.50-10.10	<u>L. Paehler</u> , N. A. Adams - Adaptive, reinforcement learning based, model management for multifidelity Monte-Carlo	<u>E.J. Hall</u> , K. Um, M. Katsoulakis, Tartakovsky - Bayesian network PDEs for flow and transport in energy materials
10.10-10.30	<u>H. Yu</u> , M.P. Juniper, L. Magri - Interpretability within a level-set data assimilation framework	<u>F. Taghon</u> , R. Pradeau, A. Dumas - Uncertainty propagation through a simplified car Model
10.30-10.50	A. Agrawal, A. Sergent, Y. Fraigneau, <u>D. Lucor</u> - Investigation of PDE-constrained deep neural networks for efficient flow field assimilation	<u>S. Adatrao</u> , A. Sciacchitano - Multi delta- t approach for peak-locking error correction and uncertainty quantification in PIV
10.50-11.10	<u>K. D. Kantarakias</u> , K. Shawki, G. Papadakis - Uncertainty quantification of time-averaged quantities and their sensitivities in chaotic systems	<u>F. Garita</u> , H. Yu, M. Juniper - A Bayesian approach for predicting thermoacoustic oscillations in a Rijke tube
11.10-11.40	Coffee Break	
11.40-13.20	ST3 – Applications II <i>Session Chair: M. Diez</i> <i>Auditorium</i>	ST4 – Environmental I <i>Session Chair: O. Knio</i> <i>Room B</i>
11.40-12.00	<u>A. Anderlini</u> , M.V. Salvetti, A. Agresta, L. Matteucci - Stochastic calibration of cavitation model parameters for simulations of 3-phase injector internal flows	<u>L. Li</u> , W. Bauer, E. Mémin - Towards a Consistent Stochastic modeling of oceanic dynamics
12.00-12.20	<u>D.Wunsch</u> , C. Hirsch, S. Abraham, F. Contino, P. Robbe, S. Vandewalle - Comparison of uncertainty propagation methods applied to industrial turbomachinery design with operational, geometrical and manufacturing uncertainties	<u>S. El Mohtar</u> , O. Knio, I. Hoteit - Bayesian Inference and Markov chain Monte Carlo sampling for Lagrangian Particle tracking in the ocean
12.20-12.40	<u>S. Morselli</u> , C. Ferrari, N. Beccati, P. Marani - Sensitivity analysis on a CFD model for prediction of a gear pump leakages	<u>S. El Mohtar</u> , O. Knio, I. Hoteit, L. Issa, I.Lakkis - Forward and backward Lagrangian particle tracking in ensemble flow fields
12.40-13.00	<u>A. Gamannossi</u> , A. Amerini, L. Mazzei, M. Poggiali, A. Andreini - Geometric uncertainty quantification of a film cooled gas turbine blade	<u>K. Gundersen</u> , G. Alendal, A. Oleynik - Bayesian convolutional neural networks as a tool to detect discharges of pollutants to marine waters through time series classification
13.00-13.20	<u>M.C. Rochoux</u> et al. - Emulating environmental modeling systems in presence of uncertainties: overview and challenges	
13.20-14.30	Lunch break	

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14.30-15.20	Keynote Lecture - V. Heuveline - Uncertainty quantification with application to medical engineering: towards a more reliable medicine? <i>Session Chair: O. Ernst</i> <i>Auditorium</i>
15.20-16.40	ST5– Biological flows <i>Session Chair: V. Heuveline</i> <i>Auditorium</i>
15.20-15.40	<u>D. Ye</u> , A. Nikishova, L. Veen, P. Zun, A. G. Hoekstra - Semi-intrusive uncertainty quantification analysis with a surrogate model for in-stent restenosis 2D model
15.40-16.00	<u>G. Del Corso</u> , F. Viola, R. Verzicco - Sensitivity analysis of an electrophysiology model for the left heart
16.00-16.20	<u>A. Mariotti</u> , S.Celi, K. Capellini, M.V. Salvetti - Stochastic analysis of the effect of inlet conditions in the hemodynamics simulation of a thoracic aortic aneurysm
16.20-16.40	<u>M.N. Antonuccio</u> , B. M. Fanni., K. Capellini, E. Sauvage, A. Mariotti, C. Capelli, S. Celi - An integrated approach of uncertainty quantification and 3D MRI techniques in guiding CFD analysis for a non-invasive study of aortic coarctation
16.40-17.10	Coffee Break
17.10-18.30	ST6– Environmental II <i>Session Chair: Gorodetsky A.A.</i> <i>Auditorium</i>
17.10-17.30	<u>A.Bevilacqua</u> , A.Patra, M. Bursik, E. B. Pitman, J.L. Macías, R. Saucedo, D. Hyman - Refining the input space of plausible future debris flows using noisy data and multiple models of the physics
17.30-17.50	M. Navarro, O. Le Maître, I. Hoteit, D. George, K. Mandli, <u>O.M. Knio</u> - Surrogate-based parameter inference in a debris flow model
17.50-18.10	<u>A. Litvinenko</u> , D. Logashenko, R. Tempone, G. Wittum, D. Keyes - Propagation of uncertainties in density-driven flow
18.10-18.30	<u>F. Pardini</u> , M. de Michieli Vitturi, S.L. Engwell, A. Neri - Uncertainty quantification in explosive volcanic eruptions: from volcanic column generation to ash dispersion and deposition
20.30	Conference dinner

Friday September 13, 2019

9.00-9.50	<p>Keynote Lecture - <u>E.F. Campana</u> and M. Diez - Sailing in a storm: UQ for ship optimization in a stochastic environment with operational uncertainty <i>Session Chair: P. Cinnella</i> <i>Auditorium</i></p>
9.50-11.10	<p style="text-align: center;">SF1 – Applications III <i>Session Chair: E.F. Campana</i> <i>Auditorium</i></p>
9.50-10.10	J. Wackers, M. Visonneau, A. Serani , R. Pellegrini , R. Broglia, <u>M. Diez</u> - Uncertainty quantification by adaptive multifidelity surrogates of noisy CFD data
10.10-10.30	<u>A. Bornaccioni</u> , E. Morales Tirado, D. Quagliarella, U. Iemma - Gradient based empirical cumulative distribution function approximation for robust aerodynamic design
10.30-10.50	A. Serafino, B. Obert, <u>P. Cinnella</u> - Assessment of gradient-based surrogate models for robust optimization in computational fluid dynamics
10.50-11.10	<u>J. Zhang</u> , X. Zhao, Quantification of parametric uncertainty in wind farm wake modeling
11.10-11.40	Coffee Break
11.40-13.00	<p style="text-align: center;">SF2 – Methodology IV <i>Session Chair: D. Lucor</i> <i>Auditorium</i></p>
11.40-12.00	<u>A.A. Gorodetsky</u> , G. Geraci, M. S. Eldred, J. D. Jakeman - Multifidelity uncertainty quantification for fluid dynamics applications
12.00-12.20	F. Nobile, <u>Q. Ayoul-Guilmond</u> , S. Ganesh - Accurate statistical estimators by continuation MLMC for engineering design problems
12.20-12.40	<u>R. Tosi</u> , R. Amela, J. Pons, R.M. Badia, R. Rossi - Scalable distributed asynchronous Monte Carlo algorithms workflow design
12.40-13.00	<u>B. Keith</u> , A. Kodakkal, M. Nuñez, R. Rossi, R. Tosi, B. Wohlmuth, and R. Wüchner - Towards risk averse structural design optimization with uncertain wind loading: Two-dimensional benchmarks
13.00-13.10	Closing

