# Uncertainty Quantification and Optimization

**18-20 Mar 2019**
**Paris**
**France**

# Table of contents

**Bayesian calibration of the Peng-Robinson fluid model for siloxane MDM vapor flows in the non-ideal regime, Gori Giulio [et al.]** **1**

**Accelerated Schwarz Method for Stochastic Elliptic PDEs, Reis Joao [et al.]** **4**

**Robust Calibration of the Catalytic Properties of Thermal Protection Materials: Application to Plasma Wind Tunnel Experiments, Del Val Anabel [et al.]** **6**

**Different measure approximations for efficient constrained multi-objective optimization under uncertainty, Rivier Mickaël** **9**

**Non-intrusive method to estimate discretization errors on a turbulent single-phase flow, Gouénard Solène [et al.]** **11**

**Surrogate-based inversion for first-arrival seismic tomography, Sochala Pierre [et al.]** **12**

**An Imprecise Probabilistic Estimator for the Transition Rate Matrix of a Continuous-Time Markov Chain, Krak Thomas [et al.]** **14**

**Airfoil Optimization Using Far-Field Analysis of the Drag Force, Morales Tirado Elisa** **16**

**Level Set Methods and Frames for Nonlinear Stochastic Problems, Pettersson Per [et al.]** **18**

**Algebra for a Space Flight Algorithm, Segret Boris [et al.]** **20**

**A Heuristic Solution to Non-Linear Filtering with Imprecise Probabilities, Krak Thomas [et al.]** **22**

**An industry ready approach to characterization and reduction of manufacturing uncertainties, Wunsch Dirk [et al.]** **24**

**An implementation of LASSO using optimisation methods for piece-wise differentiable functions, Basu Tathagata [et al.]** **26**

**Evidence-Based Robust and Reliable Optimisation of Dynamic Complex Systems, Filippi Gianluca** **28**

**AK-MCS extension for the Efficient Estimation of Extreme Quantiles and Failure Probabilities, Razaaly Nassim [et al.]** **30**

**A Framework for the Efficient Aerodynamic Shape Optimization Problems under Uncertainty, Antoniou Margarita [et al.]** **32**

**An adaptive evolutionary surrogate-based approach for single-objective bilevel optimisation, Antoniou Margarita [et al.]** **34**

**Approximating Hypervolume Contributions Using Kriging, Irawan Dani [et al.]** **36**

**Change of Probability Measure in Weighted Empirical Cumulative Distribution Function, Quagliarella Domenico** **38**

**Aerodynamic shape optimization of 2D and 3D wings under uncertainties, Kumar Dinesh** **40**

**A Surrogate-Assisted Multiple Shooting Approach for Optimal Control Problems under Severe Uncertainty, Greco Cristian [et al.]** **42**

**Near-optimal smoothing in derivative-free stochastic optimization, Menhorn Friedrich [et al.]** **44**

**Recursive Polynomial Chaos Co-Kriging for Reliability-based Design Optimisation, Korondi Peter Zeno** **46**

**Quantifying the Uncertainty on Ab-Initio Rate Coefficients by means of Bayesian Machine Learning, Venturi Simone [et al.] 48**

**Calibration of TACOT Material Database and PATO Through Bayesian Inference and Surrogate Modeling, Rostkowski Przemyslaw [et al.] 51**

**Reliability of reliability assessments, Krpelik Daniel [et al.] 53**

**Investigating Uncertainties with a Game-Benchmark, Volz Vanessa [et al.] 55**

**Uncertainty propagation in multiphysics systems of solvers: application to robust space object reentry predictions, Sanson Francois [et al.] 57**

**A particle filtering method for the opportunistic update of a space debris catalogue, Miguez Joaquin [et al.] 59**

**Searching for an optimal and reliable design under epistemic modelling uncertainty, Krpelik Daniel [et al.] 61**

**Recycling Krylov subspace strategies to solve stochastic elliptic equations, Venkovic Nicolas [et al.] 63**

**Robust multi-disciplinary ship design optimisation under uncertainty, Priftis Alexandros [et al.] 65**

**Multilevel Monte Carlo estimation of Sobol' indices for sensitivity analysis, Mycek Paul [et al.] 66**

**Robust design optimization of a hydrogen-based solar energy storage system using an efficient stepwise regression method for sparse polynomial chaos expansions, Coppitters Diederik [et al.] 68**

**Damage tolerance reliability assessment combining adaptive kriging and support vector machine, Beaucaire Paul [et al.] 70**

**Bayesian parameter calibration using surrogate models, Knio Omar 72**

**Optimization under Uncertainty of High Dimensional Problems using Quantile Bayesian Regression, Sabater Christian [et al.] 73**

**A bi-level energy management strategy for HEVs under traffic conditions., Le Rhun Arthur [et al.] 75**

**Robust Optimisation using Voronoi-Based Archive Sampling, Fieldsend Jonathan [et al.] 77**

**Opening chemical reaction paths in a plasma global model: an uncertainty quantification approach, Marmuse Florian [et al.] 79**

**Decay and Re-Entry Analysis of SpaceDebris, Minisci Edmondo [et al.] 81**

**Energy-conserving reduced-order models for incompressible flow, Sanderse Benjamin 84**

**Probabilistic learning on manifolds for the small-data challenge in Uncertainty Quantification, Soize Christian 85**

**Application of Machine Learning Techniques for the Prediction of Free Plasma Jet Oscillatory Phenomena and Cloud Classification for In-flight Icing from Experimental Data, Arizmendi Barbara [et al.] 87**

**Structured-Chromosome GA Optimisation for satellite tracking, Gentile Lorenzo 90**

**Author Index 92**

**List of sponsors 92**

# List of sponsors

**UTOPIAE Network**

UTOPIAE is a European research and training network looking at cutting edge methods bridging optimisation and uncertainty quantification applied to aerospace systems. The network will run from 2017 to 2021, and is funded by the European Commission through the Marie Skodowska-Curie Actions of H2020.

**CNRS**

The National Center for Scientific Research, or CNRS, is a public organization under the responsibility of the French Ministry of Education and Research. As the largest fundamental research organization in Europe, the CNRS carries out research in all fields of knowledge, through ten institutes.

**von Karman Institute for Fluid Dynamics**

VKI is a non-profit international educational and scientific organisation, hosting three departments (aeronautics and aerospace, environmental and applied fluid dynamics, and turbomachinery propulsion). It provides post-graduate education in fluid dynamics (research master in fluid dynamics, former "VKI Diploma Course", doctoral program, short training program and lecture series) and encourages "training in research through research".

**INRIA**

Inria, the French National Institute for computer science and applied mathematics, promotes "scientific excellence for technology transfer and society". Graduates from the world's top

universities, Inria's 2,400 employees rise to the challenges of digital sciences.
**H2020 - Actions Marie Sklodowska-Curie**