

# GEORGIOS ARAMPATZIS

Mathematics and Applied Mathematics Department, University of Crete  
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## EDUCATION

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- Doctor of Philosophy** June 2014  
Mathematics and Applied Mathematics Department, University of Crete  
Concentration: Parallel Monte Carlo Methods, simulations and numerical analysis, uncertainty quantification
- Master of Science** May 2011  
Applied Mathematics Department, University of Crete  
Concentration: Numerical Computations, Monte Carlo Methods
- Bachelor of Science** April 2006  
Applied Mathematics Department, University of Crete  
Concentration: Numerical Analysis, Numerical Computations, Partial Differential Equations

## RESEARCH EXPERIENCE

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- Mathematics & Applied Mathematics Department** 2024-present  
*Assistant Professor* University of Crete  
· Mathematical Statistics and Machine Learning
- AI2C Technologies** 2021-2023  
*Head of Research and Development* ETH Zurich  
· Machine learning for time series forecasting.
- Computational Science and Engineering Laboratory** 2021-2022  
*Senior Researcher* ETH Zurich  
· Machine learning aided equation free methods for multiscale systems.  
· Reinforcement learning and stochastic optimization.  
· Co-developer of Korali.
- Collegium Helveticum** 2018-2020  
*Senior Scientist* ETH Zurich  
· Bayesian experimental design, optimal sensor placement.  
· Artificial intelligence in medicine and collaboration with bioethicists.
- Computational Science and Engineering Laboratory** 2015-2018  
*Postdoctoral Associate* ETH Zurich  
· Uncertainty quantification in molecular dynamics, red blood cell models, and epidemiology models.  
· Co-developer of Korali, a high-performance framework for uncertainty quantification of computational models.
- Department of Mathematics and Statistics** 2014-2015  
*Postdoctoral Associate* University of Massachusetts, Amherst  
· Sensitivity analysis of kinetic Monte Carlo methods.

## Department of Mathematics and Applied Mathematics

Research Assistant

2012-2013

University of Crete

- Sensitivity analysis and simulations of kinetic Monte Carlo methods.

## Department of Mathematical Sciences

Research Assistant

summer 2011

University of Delaware

- Numerical analysis of a novel algorithm for parallel simulation of kinetic Monte Carlo methods.

## Oak Ridge National Laboratory

Research Assistant

summer 2010

Oak Ridge National Lab

- Parallelization of kinetic Monte Carlo methods on GPUS using OpenCL and CUDA.

## Institute of Applied and Computational Mathematics

Research Assistant

2005-2007

IACM FORTH, Crete

- Development of high order time marching schemes for the solution of the Euler equations using the discontinuous Galerkin method on unstructured, mixed type elements domain.
- Parallelization of several serial codes using MPI. (multigrid methods, domain decomposition of finite volume method).

## TEACHING EXPERIENCE

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### Lecturer

- *Model, Algorithms and Data: Introduction to Computing*, co-lecturer, DMAVT, ETH, Zurich, Spring 2020-2022.
- *Uncertainty Quantification and Data Analysis in Applied Sciences*, CSZ, co-lecturer, 2018-2022
- *Statistics*, Mathematical Sciences, Dep. of Mathematical Sciences, UMass, Amherst, Spring 2015.
- *Non-linear Dynamics and Chaos*, Dep. of Mathematical Sciences, UMass, Amherst, Fall 2014.

### Head Teaching Assistant

- *Model, Algorithms and Data*, SEAS, Harvard, Boston, Spring 2020-2022.
- *High Performance Computing I*, DMAVT, ETH, Zurich, Fall 2020.
- *High Performance Computing II*, DMAVT, ETH, Zurich, Spring 2019.

### Teaching Assistant

- *High Performance Computing I*, DMAVT, ETH, Zurich, Spring 2017.
- *Computational Methods for Engineering Applications*, DMAVT, ETH, Zurich, Spring 2016.
- *Numerical Analysis, Numerical Solution of Diff. Equations, Discrete Mathematics, Partial Diff. Equations, Applied Statistics*, Applied Mathematics Dep. University of Crete, 2008-2013.

## PUBLICATIONS

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### Articles in Referred Journals

- Vlachas P.R., Arampatzis G., Uhler C., and Koumoutsakos P., **Learning the Effective Dynamics of Complex Multiscale Systems**, Nature Machine Intelligence, 2022.
- Martin S.M., Wälchli D., Arampatzis G., Koumoutsakos P. **Korali: Extreme-Scale Bayesian Uncertainty Quantification and Optimization**, Computer Methods in Applied Mechanics and Engineering, 2021.
- Economides A., Arampatzis G., Alexeev D., Litvinov S., Amoudruz L., Kulakova L., Papadimitriou C., and Koumoutsakos P. **Hierarchical Bayesian Uncertainty Quantification for a Red Blood Cell Mode**, Physical Review Applied, 2021.

- Biller-Andorno N., Ferrario A., Joebges S., Kronen T., Massini F., Barth P., Arampatzis G., Krauthammer M. **AI support for ethical decision-making around resuscitation: proceed with care**, Journal of Medical Ethics, 2021.
- Chatzimanolakis M., Weber A., Arampatzis G., Wälchli D., Kičić I., Karnakov P., Papadimitriou C., Koumoutsakos P. **Optimal Allocation of Limited Test Resources for the Quantification of COVID-19 Infections**, Swiss Medical Weekly, 2021.
- Larson K., Arampatzis G., Bowman C., Chen Z., Hadjidoukas P., Papadimitriou C., Koumoutsakos P. and Matzavinos A. **Data-driven prediction and origin identification of epidemics in population networks**, Royal Society Open Science, 2021
- P. Karnakov, G. Arampatzis, I. Kičić, F. Wermelinger, D. Wälchli, C. Papadimitriou, and P. Koumoutsakos, **Data-driven inference of the reproduction number for COVID-19 before and after interventions for 51 European countries**, Swiss Medical Weekly, 2020.
- P. Weber, G. Arampatzis, G. Novati, S. Verma, C. Papadimitriou, and P. Koumoutsakos, **Optimal flow sensing for schooling swimmers**, Biomimetics, 2020.
- S. Verma, C. Papadimitriou, N. Luethen, G. Arampatzis and P. Koumoutsakos, **Optimal sensor placement for artificial swimmers**, Journal of Fluid Mechanics, 2019.
- W. Byeon, M. Domínguez-Rodrigo, G. Arampatzis, E. Baquedano, J. Yravedra, M. A. Maté-González, and P. Koumoutsakos, **Automated identification and deep classification of cut marks on bones and its paleoanthropological implications** Journal of computational science, 2019.
- Zavadlav J., Arampatzis G., Koumoutsakos P., **Bayesian selection for coarse-grained models of liquid water**, Scientific Reports, 2019.
- Karathanasopoulos N., Arampatzis G., Ganghoffer J.F., **Unravelling the viscoelastic, buffer-like mechanical behavior of tendons: A quantitative study at the fibril-fiber scale**, Journal of the Mechanical Behavior of Biomedical Materials, 2018.
- Lipková J., Arampatzis G., Chatelain P., Menze B., Koumoutsakos P., **S-Leaping: An adaptive, accelerated stochastic simulation algorithm, bridging  $\tau$ -leaping and R-leaping**, Bulletin of Mathematical Biology, 2018.
- Arampatzis G., Wälchi D., Angelikopoulos P., Wu S., Hadjidoukas P. and Koumoutsakos P., **Langevin Diffusion for Population Based Sampling with an Application in Bayesian Inference for Pharmacodynamics**, SIAM Journal on Scientific Computing, 2018.
- Kulakova L., Arampatzis G., Angelikopoulos P., Papadimitriou C., Chatzidoukas P. and Koumoutsakos P. **Experimental data over quantum mechanics simulations for inferring the repulsive exponent of the Lennard-Jones potential in Molecular Dynamics**, Scientific Reports, 2017.
- Mosimann B., Arampatzis G., Amylidi-Mohr S., Bessire A., Spinelli M., Koumoutsakos P., Surbek D., Raio L. **Reference ranges for fetal atrioventricular and ventriculoatrial time intervals and their ratios during normal pregnancy**, Fetal Diagnosis and Therapy, 2017.
- Arampatzis G., Bellet L.R., Katsoulakis M., **Efficient estimators for likelihood ratio sensitivity indices of complex stochastic dynamics**, Journal of Chemical Physics, 2016.
- Arampatzis G., Katsoulakis M., Pantazis I., **Pathwise Sensitivity Analysis in Transient Regimes**, Rocky Mountain Journal of Mathematics, 2015.
- Arampatzis G., Katsoulakis M., Pantazis I., **Accelerated Sensitivity Analysis in High-Dimensional Stochastic Reaction Networks**, PLOS ONE, 2014.
- Arampatzis G. and Katsoulakis M.A. **Goal oriented sensitivity analysis for lattice kinetic Monte Carlo simulations**, Journal of Chemical Physics, 2014.
- Arampatzis G., Katsoulakis M.A., Plecháč P. **Parallelization, processor communication and error analysis in lattice kinetic Monte Carlo**, SIAM Numerical Analysis, 2014.
- Arampatzis G., Katsoulakis M.A., Plecháč P., Taufer M. and Xu L.. **Hierarchical Fractional Step approximations and parallel kinetic monte carlo algorithms**, Journal of Computational Physics, 2012.

- Arampatzis G., Vavilis P., Touloupoulos I., Ekaterinaris J. A., **Implicit High-Order Time-Marching Schemes for the Linearized Euler Equations**, AIAA Journal, 2007.

### Chapter in Books

- Cailliez F., Pernot P., Rizzi F., Jones R., Knio O., Arampatzis G., and Koumoutsakos P., **Bayesian calibration of force fields for molecular simulations**, in **Uncertainty quantification in multiscale materials modeling**, Elsevier, 2020.

### Articles in Conferences

- Wälchli D., Martin S. M., Economides A., Amoudruz L., Arampatzis G. , Bian X., and Koumoutsakos P., **Load balancing in large scale bayesian inference**, in Proceedings of the platform for advanced scientific computing conference, 2020.
- Arampatzis G., Wälchli D., Weber P., Rästas H., and Koumoutsakos P.,  **$(\mu, \lambda)$ -CCMA-ES for constrained optimization with an application in pharmacodynamics**, Proceedings of the Platform for Advanced Scientific Computing conference, 2019.
- **Implicit High Order Marching Schemes for the Linearized Euler equations**, 1<sup>st</sup> Greek French Workshop on Computational Aspects of Acoustic Propagation.

### Under review

- Amoudruz L., Economides A., Arampatzis G., and Koumoutsakos P., **The stress-free state of human erythrocytes: data driven inference of a transferable RBC model**, in **Biophysical Journal**.

### AWARDS

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- Maria Manassaki Scholarship, University of Crete, 2009-2010
- Scholarship from the Institute of Applied and Computational Mathematics (IACM, FORTH), 2006-2008

### TECHNICAL STRENGTHS

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<b>Computer Languages</b>	C, C++, Python, FORTRAN
<b>Software</b>	Matlab
<b>Libraries</b>	MPI, OpenMP, OpenCL, CUDA