Khachik Sargsyan

CONTACT INFORMATION

Sandia National Laboratories
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GENERAL

- *Expertise*: Applied mathematician with 10+ years of post-Ph.D. research experience in stochastic processes, statistical analysis, numerical methods, model reduction, uncertainty quantification and machine learning with applications in biochemistry, statistical physics, population dynamics, fluid dynamics, climate science.
- *Objective*: Research-oriented position in machine learning and data science, with emphasis on probabilistic modeling and algorithm development.

EDUCATION

University of Michigan, Ann Arbor, MI, USA

- Ph.D., Applied Mathematics, August, 2007.

  Thesis: "Mean First Passage Times in the Near-Continuum Limit of Birth-Death Processes".

Moscow Institute of Physics and Technology, Moscow, Russian Federation

- B.S., Applied Physics and Mathematics, June, 2001.

PROFESSIONAL EXPERIENCE

Sandia National Laboratories, Livermore, CA, USA

- *Principal Member of Technical Staff* **2015 - present**
  Member or lead of several research projects related to computational methods and uncertainty quantification with applications in chemical kinetics, climate science, computational fluid dynamics, and high-performance computing.
- *Senior Member of Technical Staff* **2010 - 2015**
- *Postdoctoral Fellow* **2007 - 2010**

University of Michigan, Ann Arbor, MI, USA

- *Graduate Student Research Assistant* **2003 - 2006**
  Supported by NSF and Michigan Center for Theoretical Physics. Member of the 3-year NSF research project group "Fronts, Fluctuations and Growth".

Moscow Institute of Physics and Technology, Moscow, Russian Federation

- *Research Assistant* **1999 - 2002**
  Institute for Computer Aided Design of RAS and Institute for System Programming of RAS.

SUMMARY

- Over 60 publications in peer-reviewed academic journals
- Over 100 research presentations in academic conferences and workshops
- Mentoring of ∼10 graduate students and postdoctoral fellows
- Estimated ∼200K lines of scientific programming in C/C++, Python, Matlab, Mathematica
- Teaching and tutoring experience of a wide range of undergraduate and graduate level math and engineering classes
- As a high-schooler, participated in International Math Olympiad in 1996 (Honorable mention) and 1997 (Bronze medal)
- Fluent in English, Russian, Armenian. Reading knowledge of French.

Selected Publications

- K. Sargsyan, X. Huan, H. Najm. "Embedded Model Error Representation for Bayesian Model Calibration", arXiv:1801.06768, 2018.
- K. Sargsyan, "Surrogate Models for Uncertainty Propagation and Sensitivity Analysis", "Forward Problems" section of UQ Handbook, Springer, 2017.
- K. Sargsyan, H. N. Najm, R. Ghanem, "On the Statistical Calibration of Physical Models", *International Journal for Chemical Kinetics*, 47:4, pp. 246–276, 2015.
- K. Sargsyan, F. Rizzi, P. Mycek, C. Safta, K. Morris, H. N. Najm, O. Le Matre, O. Knio, B. Debusschere, "Fault Resilient Domain Decomposition Preconditioner for PDEs", *SIAM Journal on Scientific Computing*, 37:5, pp. 2317–2345, 2015.
- K. Sargsyan, C. Safta, H. N. Najm, B. Debusschere, D. Ricciuto, P. Thornton, "Dimensionality Reduction for Complex Models via Bayesian Compressive Sensing", *International Journal of Uncertainty Quantification*, 4:1, pp.63–93, 2014.
- K. Sargsyan, C. Safta, B. Debusschere, H. Najm, "Multiparameter Spectral Representation of Noise-Induced Competence in Bacillus Subtilis", *IEEE/ACM Trans. Comp. Biol. and Bioinf.*, 9:6, pp. 1709–1723, 2012.
- K. Sargsyan, C. Safta, B. Debusschere and H. N. Najm, "Uncertainty Quantification given Discontinuous Model Response and a Limited Number of Model Runs". *SIAM Journal on Scientific Computing* 34:1, pp. 44–64, 2012.
- K. Sargsyan, B. Debusschere, H. N. Najm and O. Le Maître, "Spectral Representation and Reduced Order Modeling of the Dynamics of Stochastic Reaction Networks via Adaptive Data Partitioning". *SIAM Journal on Scientific Computing*, 31, pp.4395-4421, 2010.
- K. Sargsyan, B. Debusschere, H. N. Najm and Y. Marzouk, "Bayesian Inference of Spectral Expansions for Predictability Assessment in Stochastic Reaction Networks". *Journal of Computational and Theoretical Nanoscience*, 6:10, 2009.

Academic Activities

- Invited referee for *Physics Letters A, Journal of Computational Physics, Journal of Physical Chemistry, Journal of Guidance, Control, and Dynamics, Mathematical Biosciences, Multiscale Modeling and Simulation, Physica D, The European Physical Journal B, SIAM Journal on Scientific Computing, Computational Geosciences, AIChE Journal.*
- Organized several sessions at recognized national and international conferences, such as SIAM UQ, SIAM CS&E, SIAM AN, AGU, ISBA, USNCCM, with over 100 speakers total.
- Member of Society of Industrial and Applied Mathematics (SIAM), American Geophysical Union (AGU), International Society of Bayesian Analysis (ISBA), American Statistical Association (ASA)
- Major contributor to the UQTk, a Python/C++ software kit for uncertainty quantification, `sandia.gov/UQToolkit`
- Land Modeling UQ lead in the multi-lab project "Energy Exascale Earth System Model", E3SM, `e3sm.org`.
- Member of the FASTMath SciDAC institute, focused on applied math algorithms, tools, and software for HPC applications, `fastmath-scidac.llnl.gov`.