Khachik V. Sargsyan

CONTACT INFORMATION

Sandia National Laboratories
Transportation Energy Center
Reacting Flow Research Department
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EDUCATION

University of Michigan, Ann Arbor, MI, USA

Ph.D., Applied and Interdisciplinary Mathematics, August, 2007.

- Dissertation Topic: "Mean First Passage Times in the Near-Continuum Limit of Birth-Death Processes".
- Advisor: Charles R. Doering.

Moscow Institute of Physics and Technology, Moscow, Russia

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

FELLOWSHIPS, AWARDS, OLYMPIADS

Geophysical Fluid Dynamics Summer Program Fellow, Woods Hole Oceanographic Institution, 2005.

Mathematics Department Summer Fellowship, University of Michigan, 2003.

MIPT Students' Math Olympiad, 3rd prize, 1998.

Soros Student Grant, Soros Foundation, 1997.

Gold Medal for extraordinary successes in high school, 1997.

38^{th} International Math Olympiad, Mar-del-Plata, Argentine, bronze medal, 1997.

Tournament of the Cities, Commonwealth of Independent States, 1st prize, 1996.

37^{th} International Math Olympiad, Bombay, India, honorable mention, 1996.

TEACHING EXPERIENCE

University of Michigan, Ann Arbor, MI, USA

- *Graduate Student Instructor* **September, 2006 - May, 2007**
  Teaching Calculus I, Fall 2006, Winter 2007. Full responsibility for lectures, discussion sessions, homework assignments, quizzes.

- *Graduate Student Instructor* **September, 2002 - May, 2003**
  Taught Precalculus, Fall 2002, Winter 2003. Full responsibility for lectures, discussion sessions, homework assignments, quizzes.

- *Private Tutor* **2003 - 2005**
  Tutored undergraduate-level Number Theory, Numerical Methods, Probability Theory, Abstract Algebra, Linear Algebra, Partial Differential Equations, Mathematical Biology, Mathematical Logic, Honors Calculus.

- *Grader* **2003 - 2005**
  Math 354 – Fourier Analysis and its Applications (Winter 2003),
  Math 454 – Boundary Value Problems for Partial Differential Equations (Spring 2003),
  Math 351 – Principles of Analysis (Winter 2004),
  Math 556 – Methods of Applied Mathematics (Fall 2005).

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Research Interests

- *General*: Stochastic processes, statistical analysis, numerical methods with applications in biochemistry, statistical physics, population dynamics, climate modeling.
- *Specific*: Numerical stochastic methods, uncertainty quantification, model reduction, Bayesian inference, multiscale modeling, large deviations.

Research Experience

Sandia National Laboratories, Livermore, CA, USA

- *Postdoctoral Appointee* **July, 2007 - present**
  "Uncertainty Quantification in Stochastic Dynamical Systems", DOE ASCR (leading contributor).
  "Uncertainty Quantification for Large Scale Ocean Circulation Predictions", Sandia Labs' Senior's Counsil LDRD (leading contributor).
  "Quantifying the Margin of High-Consequence Climate Change", NNSA BER, Sandia subtask (leading contributor).
  "Analysis of Stochasticity in Immune System Signaling Pathways", Sandia Labs' LDRD.

University of Michigan, Ann Arbor, MI, USA

- *Graduate Student Research Assistant* **September, 2003 - August, 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, Russia

- *Research Project Member* **2001 - 2002**
  Institute for System Programming of Russian Academy of Sciences.
- *Research Assistant* **1999 - 2001**
  Institute for Computer Aided Design of Russian Academy of Sciences.

Journal Papers

- Khachik V. Sargsyan, Bert J. Debusschere, Habib N. Najm and Olivier Le Maître, "Spectral representation and reduced order modeling of the dynamics of stochastic reaction networks via adaptive data partitioning". *SIAM Journal on Scientific Computing, accepted, 2009.*
- Khachik V. Sargsyan, Bert J. Debusschere, Habib N. Najm and Youssef M. Marzouk, "Bayesian inference of spectral expansions for predictability assessment in stochastic reaction networks". *Journal of Computational and Theoretical Nanoscience, 6:10, 2009.*
- Charles R. Doering, Khachik V. Sargsyan, Leonard M. Sander and Eric Vanden-Eijnden, "Asymptotics of rare events in birth-death processes bypassing the exact solutions". *Journal of Physics: Condensed Matter, 19:6, 2007.*
- Charles R. Doering, Khachik V. Sargsyan and Peter Smereka, "A numerical method for some stochastic differential equations with multiplicative noise". *Physics Letters A, 344:2-4, 2005, pp.149-155.*
- Charles R. Doering, Khachik V. Sargsyan and Leonard M. Sander, "Extinction times for birth-death processes: exact results, continuum asymptotics, and the failure of the Fokker-Planck approximation". *SIAM Journal on Multiscale Modeling and Simulation, 3:2, 2005, pp.283-299.*

Conference Papers

- Khachik V. Sargsyan, "Fluctuations in chemical reactions in a large volume". *Proc. of Geophysical Fluid Dynamics Program, Woods Hole Oceanographic Institution, 2005.*
- Khachik V. Sargsyan, Bert J. Debusschere and Habib N. Najm, "Spectral Representation and Reduced Order Modeling of Stochastic Reaction Networks". *Model Reduction in Reacting Flows, Workshop Proceedings, University of Notre Dame, 2009.*

Selected Talks, Reports, Presentations

- "Spectral Representation and Reduced Order Modeling of Stochastic Reaction Networks". *International Workshop on Model Reduction in Reacting Flows*, University of Notre Dame, IN, USA. April, 2009.
- "Predictability Assessment in Stochastic Reaction Networks". *SIAM Annual Meeting, Minisymposium on Uncertainty Quantification*, San Diego, CA, USA. July, 2008.
- "Mean First Passage Times and their Asymptotics for Markov Jump Processes". *Applied and Interdisciplinary Mathematics Student Seminar*, University of Michigan, Ann Arbor, MI, USA. March, 2007.
- "Rare Events in Stochastic Systems". *Invited Talk*, Biological and Energy Sciences Center, Sandia National Laboratories, Livermore, CA, USA. March, 2007.
- "Rare Events in Stochastic Systems". *Invited Talk*, Department of Applied Physics and Applied Mathematics, Columbia University, New York, NY, USA. January, 2007.
- "Fluctuations in chemical reactions in a large volume". *Geophysical Fluid Dynamics Program*, Woods Hole Oceanographic Institution, Woods Hole, MA, USA. August, 2005.

Other Conferences, Workshops, Academic Activities

- Refereed for *Physics Letters A*.
- *SIAM CSE Meeting*, Miami, FL. March, 2009.
- *Applied Mathematics Principal Investigators Meeting*, Argonne National Laboratory, Argonne, IL. October, 2008.
- *Opportunities and Challenges in Applying Polynomial Chaos Expansions to Engineering Design and Analysis*, University of Southern California, Los Angeles, CA. August, 2008.
- *Uncertainty Analysis in Complex, Multi-Physics Applications*, Stanford University, Stanford, CA. July, 2008.
- *International Conference on Systems Biology*, Long Beach, CA. October, 2007.
- Funded academic visit, Prof. Eric Vanden-Eijnden (currently at Courant Institute), Department of Mathematics, University of California, Berkeley. May, 2006.
- *Stochastic and Statistical Parametrization of Unresolved Features in the Atmosphere and Upper Ocean*, National Center for Atmospheric Research, Boulder, CO. March, 2006.
- *Biological systems and soft materials: Future directions in statistical physics. A symposium on the interface of statistical physics, biology, and chemistry*, Virginia Tech, Blacksburg, VA. March, 2004.
- *GSI Workshop for international graduate student instructors*, Center for Research on Learning and Teaching/English Language Institute, Ann Arbor, MI. August, 2002.

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Memberships

- Society for Industrial and Applied Mathematics (SIAM).
- American Mathematical Society (AMS).
- American Physical Society (APS).

Additional Information

Personal

- Born October 18, 1980, Yerevan, Armenia.
- Citizen of Republic of Armenia.
- Fluent in English, Russian, Armenian. Reading knowledge of French.
- Single.

Computer Skills

- C/C++, Python, Fortran.
- Matlab, Mathematica, Maple, Mathcad.
- Java, JavaScript, HTML.
- Tex, LaTeX.

References

Upon request.