

Yoonsang Lee

Department of Mathematics
Lawrence Berkeley National Laboratory
27 N. Main Street, Hanover, NH 03755

Email : yoonsang.lee@dartmouth.edu
Homepage : <https://math.dartmouth.edu/~ylee/>
Skype : ysang263

Research Interests

- Computational Mathematics, Statistics and Physics
- Data Analysis and Assimilation • Bayesian Inference • Uncertainty Quantification
- Multiscale and Stochastic Modeling, Analysis, and Simulation
- Computational Fluid Dynamics • Combustion

Employment

Assistant Professor, Department of Mathematics, Dartmouth College, August 2018 - current

Postdoctoral fellow, Center for Computational Sciences and Engineering,
Lawrence Berkeley National Laboratory, June 2017 - July 2018

Postdoctoral fellow, Courant Institute of Mathematical Sciences,
New York University, June 2013 - May 2017
Mentor : Andrew J. Majda

Education

Ph.D. in Mathematics, University of Texas at Austin, May 2013
Thesis Title : Towards Seamless Multiscale Computations
Advisor : Bjorn Engquist

B.S. in Mathematics, College of Natural Science, Seoul National University
B.S. in Physics Education, College of Education, Seoul National University

Publications and preprints

Books

1. Y. Lee, Y. Kim, D. S and H. C, *Science for High School Students* (in Korean), ETOOS, 2006, ISBN-13: 9788957352571

Journal papers and preprints

1. Y. Lee and A. J. Majda, *Multiscale Data Assimilation and Prediction using Clustered Particle Filters*, submitted for publication, 2017
2. Y. Lee, A. J. Majda and Di Qi, *Stochastic superparameterization and multiscale filtering of turbulent tracers*, SIAM Multiscale Modeling and Simulation, 15(1), 215–234, 2017

3. Y. Lee, A. J. Majda and Di Qi, *Preventing catastrophic filter divergence using adaptive additive inflation for baroclinic turbulence*, *Monthly Weather Review*, 145(2), 669–682, 2017
4. Y. Lee and A. J. Majda, *State estimation and prediction using clustered particle filters*, *Proceedings of the National Academy of Sciences of the United States of America*, 113(51), 14609–14614, 2016
5. Y. Lee and B. Engquist, *Multiscale numerical methods for advection-diffusion in incompressible turbulent flow fields*, *Journal of Computational Physics* 317(15), 33–46, 2016
6. I. Grooms and Y. Lee, *A framework for variational data assimilation with superparameterization*, *Nonlin. Processes. Geophys.* 22, 601–611, 2015
7. I. Grooms, Y. Lee and A. J. Majda, *Ensemble filtering and low-resolution model error: Covariance inflation, stochastic parameterization, and model numerics*, *Mon. Wea. Rev.* 143, 3912–3924, 2015
8. I. Grooms, Y. Lee and A. J. Majda, *Numerical schemes for stochastic backscatter in the inverse cascade of quasigeostrophic turbulence*, *SIAM Multiscale Modeling and Simulation*, 13(3), 1001–1021, 2015
9. Y. Lee and A. J. Majda, *Multiscale methods for data assimilation in turbulent systems*, *SIAM Multiscale Modeling and Simulation*, 13(2), 691–173, 2015
10. A. J. Majda and Y. Lee, *Conceptual dynamical models for turbulence*, *Proceedings of the National Academy of Sciences of the United States of America*, 111 18, 6548–6553, 2014
11. I. Grooms, Y. Lee and A. J. Majda, *Ensemble Kalman filters for dynamical systems with unresolved turbulence*, *Journal of Computational Physics*, 273 15, 435–452, 2014
12. Y. Lee and B. Engquist *Variable step size multiscale methods for stiff and highly oscillatory dynamical systems*, *Discrete and Continuous Dynamical Systems - Series A*, 34 3, 1079–1097, 2014
13. G. Ariel, B. Engquist, S. Kim, Y. Lee and R. Tsai, *A multiscale method for highly oscillatory dynamical systems using a Poincarè map type technique*, *Journal of Scientific Computing*, 54 2-3, 247–268, 2013
14. Y. Lee and B. Engquist, *Fast integrators for dynamical systems with several temporal scales*, arXiv:1510.05728

Work in preparation

1. (with J. Bell and M. Day) *Importance sampling for computationally expensive target distributions*
2. *Effective particle filtering for non-Gaussian systems*
3. *Fast explicit time integration for nonlinear parabolic equations without scale separation*

Talks

Bay Area Scientific Computing Day 2017, Lawrence Berkeley National Laboratory, Dec 14, 2017

Applied Mathematics seminar, Univ. of California Berkeley, October 4, 2017

Applied Mathematics seminar, Univ. of California Santa Cruz, October 2, 2017

Texas Applied Mathematics and Engineering Symposium, Sep 21, 2017

Korean-American Scientists and Engineers Association seminar, Berkeley chapter, July 20, 2017

Mini-symposium "Data Assimilation and Nonlinear Filtering", SIAM Annual Meeting AN17, July 11, 2017

Numerical Analysis/Scientific Computing seminar, Courant Institute, March 10, 2017

Applied Mathematics Seminar, University of Victoria, Feb 24, 2017

Applied Mathematics Seminar, University of Waterloo, Jan 19, 2017

Physics Education Colloquium, Seoul National University, January 13, 2017

Computational Mathematics seminar, KAIST, January 12, 2017

Mathematics seminar, UNIST, January 11, 2017

Numerical Analysis and Scientific Computing seminar, Seoul National University, January 9, 2017

Computational Science and Engineering seminar, Yonsei University, January 4, 2017

American Geophysical Union Fall Meeting, NG23B: Advances in Data Assimilation, Predictability, and Uncertainty Quantification I, San Francisco, Dec 13, 2016

Department of Mathematics Colloquium, University of California San Diego, Dec 2, 2016

ONR-MURI Workshop, Courant Institute of Mathematical Sciences, New York, Oct 21, 2016

NSF/DoD Research Experiences for Undergraduates Seminar, College of Staten Island CUNY, July 15, 2016

The 7th EnKF Data Assimilation Workshop, Pennsylvania State University, May 25, 2016

Math/ICES Center of Numerical Analysis Seminar, University of Texas at Austin, April 11, 2016

ONR-MURI Workshop, Courant Institute of Mathematical Sciences, New York, Jan 29, 2016

Center for Applied Scientific Computing, Lawrence Livermore National Laboratory, Livermore, CA, April 10, 2015.

Applied Mathematics Seminar, Department of Mathematics, Georgia Institute of Technology, Atlanta, GA, March 23, 2015

The 39th SIAM Southeastern Atlantic Section Conference (SIAM-SEAS), University of Alabama at Birmingham, March 21, 2015

Multiscale phenomena: modeling, analysis and computation, Center for Scientific Computation And Mathematical Modeling (CSCAMM), the University of Maryland, October 27, 2014

QoLT Lecture Series - Scientific Computing in Science and Engineering, Seoul National University, South Korea, May 1, 2014

ONR-MURI Workshop, Courant Institute of Mathematical Sciences, New York, Jan 21, 2014.

ICIAM 2011, Jul 18–22, 2011

Texas Applied Mathematics Meetings for Students, University of Houston, Mar 26–27, 2010

Numerical Analysis Seminar, University of Texas at Austin, Mar 3, 2010

Nonlinear Schrodinger Equations Seminar, University of Texas at Austin, Oct 10, 2008

Posters

Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology, June 3-4, 2016

ICES Thematic Workshop on Multiscale Modeling, University of Texas at Austin, April 29–30, 2013.

1st International Conference on Dynamics of Differential Equations, Georgia Tech, March 16–20, 2013.

Frontiers in Computational Physics : Modeling the Earth System, NCAR, December 16–20, 2012.

The International Conference on the Frontier of Computational and Applied Mathematics: Tony Chan's 60th Birthday Conference, IPAM UCLA, June 8–10, 2012.

Services

Journal referee for

SIAM Multiscale Modeling and Simulation

SIAM Journal on Uncertainty Quantification

Journal of Computational Physics

International Journal for Numerical Methods in Fluids

Monthly Weather Review

Awards

Research Development Award, University of Texas at Austin, Summer 2011

Professional Development Award, University of Texas at Austin, Spring 2010

Dean Award, College of Education, Seoul National University, Feb 2006

Merit Scholarships, Seoul National University, 1999-2002, 2005

Fellow Scholarship, Department of Physics Education, Seoul National University, Fall 1999

Research and Organization Experience

The Organizer of Junior Numerical Analysis Seminar, University of Texas at Austin, Spring-Fall 2011

Research Assistant, University of Texas at Austin, Supervisor : Bjorn Engquist, Fall 2009, Spring-Summer 2010, Summer-Fall 2011

POSTECH Laboratory Participation Program, Materials Physics and Calorimetry Research lab., Pohang University of Science and Technology, Mentor : Yoonhee Jung, Summer 2001

POSTECH Research Camp, Pohang University of Science and Technology, Summer 2000

President, Computational Physics Group for Students, Department of Physics, Seoul National University, Spring 2000-Fall 2001

Teaching Experience

Teaching assistant, University of Texas at Austin, Fall 2007, Spring 2008-Summer 2009, Fall 2010, Spring 2011, Spring 2012, Summer 2012, Fall 2012

Numerical Analysis (graduate prelim class), Calculus I, II, Linear Algebra, Mathematics for liberal art students,

Teacher's license, Science and Physics for middle and high schools, South Korea

Technical Skills

C/C++, OpenMP, MPI, OpenCL, R, Python