

Noemi Petra

Applied Mathematics
School of Natural Sciences
University of California, Merced
5200 N. Lake Road
Merced, CA 95343

Office: ACS 369
☎ +1 209 228 7619
✉ npetra@ucmerced.edu
🌐 <http://faculty.ucmerced.edu/npetra/>

1 Biographical data

A. Education

- 2005-2010 **Ph.D. Applied Mathematics**, University of Maryland, Baltimore County, Baltimore, MD, USA (Advisors: Drs. Susan Minkoff and John Zweck)
- 2005-2007 **M.S. Applied Mathematics**, University of Maryland, Baltimore County, Baltimore, MD, USA
- 2002-2003 **M.S. Computer Science**, “Babeş-Bolyai” University, Cluj-Napoca, Romania
- 1998-2002 **B.S. Mathematics & Computer Science**, “Babeş-Bolyai” University, Cluj-Napoca, Romania

B. Former and Current Positions and Appointments

- **Associate Professor**, Applied Mathematics, School of Natural Sciences, University of California, Merced, CA, 2020-current
- **Assistant Professor**, Applied Mathematics, School of Natural Sciences, University of California, Merced, CA, 2014-2020
- **Summer Visiting Faculty**, Mathematics and Computer Science Division, Argonne National Laboratory, Summers 2015, 2016 (Co-PI/collaborator: Dr. Mihai Anitescu)
- **Post-Doctoral Research Associate**, The University of Texas at Austin, Oden Institute for Computational Engineering and Sciences, 10/11-08/14 (Mentor: Dr. Omar Ghattas)
- **ICES Post-Doctoral Fellow** (currently called the “Peter O’Donnell, Jr. Postdoctoral Fellowship”), The University of Texas at Austin, Oden Institute for Computational Engineering and Sciences, 09/10-10/11 (Mentor: Dr. Omar Ghattas)

C. Research Interests

- General: Numerical analysis, large-scale (deterministic and statistical, infinite-dimensional) inverse problems, PDE-constrained optimization, uncertainty quantification and prediction, model errors, optimal experimental design, optimization under uncertainty
- Methods: Finite element, boundary element, adjoint-based inversion, second order adjoints, Hessians and their approximations, Bayesian inference, Markov chain Monte Carlo (MCMC), stochastic Newton MCMC
- Applications: Cryosphere (e.g., ice sheet dynamics), Geoscience (e.g., wave propagation, mantle convection, etc.), Power grid, Optics (e.g., trace gas sensing)

2 Teaching and Education

A. Teaching Experience

Fall 2021	Instructor	Math 292 - <i>Inverse Problems (special topics, grad)</i> , Applied Mathematics, University of California, Merced
Spring 2021	Instructor	Math 232 - <i>Numerical Analysis II (grad)</i> , Applied Mathematics, University of California, Merced
Fall 2020	Instructor	Math 130 - <i>Numerical Analysis</i> , Applied Mathematics, University of California, Merced
Spring 2020	Instructor	Math 140 - <i>Numerical Optimization</i> , Applied Mathematics, University of California, Merced
Fall 2019	Instructor	Math 130 - <i>Numerical Analysis</i> , Applied Mathematics, University of California, Merced
Spring 2019	Instructor	Math 126 - <i>Partial Differential Equations</i> , Applied Mathematics, University of California, Merced
Fall 2017	Instructor	Math 130 - <i>Numerical Analysis</i> , Applied Mathematics, University of California, Merced
Spring 2017	Instructor	Math 126 - <i>Partial Differential Equations</i> , Applied Mathematics, University of California, Merced
Fall 2016	Instructor	Math 130 - <i>Numerical Analysis</i> , Applied Mathematics, University of California, Merced
Spring 2016	Instructor	Math 132 - <i>Numerical Analysis II</i> , Applied Mathematics, University of California, Merced
Fall 2015	Instructor	Math 292 - <i>Special Topics: Computational and Variational Inverse Problems</i> , Applied Mathematics, University of California, Merced
Spring 2015	Instructor	Math 132 - <i>Numerical Analysis II</i> , Applied Mathematics, University of California, Merced
Spring 2013	Co-teaching	GEO 384F - <i>Computational Methods for Geophysics</i> , The University of Texas at Austin (instructor Omar Ghattas) <i>Responsibilities</i> : class, homework assignments and projects designs, teaching, advising / office hours, grading
Fall 2009	Grader	Math 710 - <i>Special Topics in Mathematics – Numerical Solution of Partial Differential Equations</i> , University of Maryland, Baltimore County
2008–2009	Grader	Math 630 - <i>Matrix Analysis</i> , University of Maryland, Baltimore County (<i>two semesters</i>)
2006	Teaching Assistant	Math 151 - <i>Calculus and Analytic Geometry</i> , University of Maryland, Baltimore County (<i>three semesters</i>)
Fall 2005	Grader	Math 301 - <i>Introduction to Mathematical Analysis</i> , University of Maryland, Baltimore County
1997 - 1998	Teacher	High school of Dumbraveni, Romania

B. Mentorship

i. Undergraduate mentorship

- Stefany Arevalo, “Solving PDEs with the finite element method using Firedrake”, Summer 2020 (Will join the Computational Media Department Graduate Program, UC Santa

Cruz in Fall 2021.)

- Anna Kucherova and Amitoj Kahlon, “The influence of data on the reconstruction of parameters in an inverse problem”, Summer 2019 (Anna is currently grad student in the Applied Mathematics Department, UC Merced.)
- Timothy Trisnadi, “Parameter Estimation for an Elliptic Partial Differential Equation via Semi-Analytical Solution Approach”, Summer 2017 (Currently Senior Analyst at Goldman Sachs.)

ii. Graduate mentorship

- Radoslav Vuchkov, “Hessian-apply Approximations for Large-Scale Inverse Problems”, Expected graduation: 2022
- Tucker Hartland, “Hessian Preconditioning for Large-Scale PDE Constrained Optimization Problems”. Expected graduation: 2023

iii. Postdoc mentorship

- Ki-Tae Kim, 09/01/2019-, Works on hIPPYlib.
- Olalekan Babaniyi, 08/01/2018-07/31/2019, Currently Assistant Professor at Rochester Institute of Technology.
- Ruanui Nicholson, 09/01/2016-09/01/2017. Currently a Research Fellow in the Department of Engineering Science at the University of Auckland in New Zealand.

iv. UC Merced SIAM Student Chapter Faculty Advisor (2015-current)

3 Publications

A. To appear, submitted or in preparation

- KT Kim, U. Villa, M. Parno, Y. Marzouk, O. Ghattas, and N. Petra. “hIPPYlib-MUQ: A Bayesian Inference Software Framework for Integration of Data with Complex Predictive Models under Uncertainty” (Submitted.)
- C. G. Petra, M. Salazar De Troya, **N. Petra**, Y. Choi, G. M. Oxberry, and D. Tortorelli. “A quasi-Newton interior-point method for optimization in Hilbert spaces”. (Submitted.)

B. Articles in peer-reviewed journals

- **N. Petra** and E. W. Sachs. “Second Order Adjoints in Optimization”, In: Al-Baali M., Purnama A., Grandinetti L. (eds) Numerical Analysis and Optimization. NAO 2020. Springer Proceedings in Mathematics & Statistics, vol 354. Springer (2021)
- O. Babaniyi, R. Nicholson, U. Villa, and **N. Petra**. “Inferring the basal sliding coefficient field for the Stokes ice sheet model under rheological uncertainty”, The Cryosphere, 15, pp. 1731–1750 (2021)
- U. Villa, **N. Petra**, and O. Ghattas, “hIPPYlib: An Extensible Software Framework for Large-Scale Inverse Problems Governed by PDEs; Part I: Deterministic Inversion and Linearized Bayesian Inference”. ACM Transactions of Mathematical Software (TOMS), 47(2), Article 16 (2021)

- A. Alexanderian, **N. Petra**, G. Stadler, I. Sunseri. “Optimal design of large-scale Bayesian linear inverse problems under reducible model uncertainty: good to know what you don’t know”, *SIAM/ASA Journal on Uncertainty Quantification*, 9(1), 163-184 (2021)
- R. G. Vuchkov, C. G. Petra and **N. Petra**. “On the Derivation of Quasi-Newton Formulas for Optimization in Function Spaces”, *Numerical Functional Analysis and Optimization*, 41:13, 1564-1587 (2020)
- E. M. Constantinescu, **N. Petra**, J. Bessac and C. G. Petra, “Statistical Treatment of Inverse Problems Constrained by Differential Equations-Based Models with Stochastic Terms”. *SIAM/ASA J. Uncertainty Quantification*, 8(1), 170–197 (2020)
- U. Villa, **N. Petra**, O. Ghattas. “hIPPYlib: An extensible software framework for large-scale inverse problems”, *Journal of Open Source Software (JOSS)*, 3 (30), 940 (2018)
- R. Nicholson, **N. Petra**, J. Kaipio, “Estimation of the Robin coefficient field in a Poisson problem with uncertain conductivity field”. *Inverse Problems*, Volume 34, Number 11, (2018)
- A. Alexanderian, **N. Petra**, G. Stadler, and O. Ghattas, “Mean-Variance Risk-Averse Optimal Control of Systems Governed by PDEs with Random Parameter Fields Using Quadratic Approximations”, *SIAM Journal on Uncertainty Quantification*, Vol. 5, pp.1166 -1192 (2017)
- **N. Petra**, C. G. Petra, Z. Zhang, E. M. Constantinescu, and M. Anitescu. “A Bayesian Approach for Parameter Estimation with Uncertainty for Dynamic Power Systems”, *IEEE Transactions on Power Systems*, 32(4), (2017)
- H. Zhu, **N. Petra**, G. Stadler, T. Isaac, T. J. R. Hughes, O. Ghattas. “Inversion of geothermal heat flux in a thermomechanically coupled nonlinear Stokes ice sheet model”, *The Cryosphere*, 10, pp. 1477-1494 (2016)
- A. Alexanderian, **N. Petra**, G. Stadler, and O. Ghattas, “A Fast and Scalable Method for A-Optimal Design of Experiments for Infinite-dimensional Bayesian Nonlinear Inverse Problems”, *SIAM Journal on Scientific Computing*, 38(1), pp. A243-A272 (2016)
- T. Isaac, **N. Petra**, G. Stadler and O. Ghattas, “Scalable and efficient algorithms for the propagation of uncertainty from data through inference to prediction for large-scale problems, with application to flow of the Antarctic ice sheet”, *Journal of Computational Physics*, 296, pp. 348-368 (2015)
- **N. Petra**, J. Martin, G. Stadler, O. Ghattas. “A computational framework for infinite-dimensional Bayesian inverse problems: Part II. Stochastic Newton MCMC with application to ice sheet inverse problems”, *SIAM Journal on Scientific Computing*, 36(4), pp. A1525-1555 (2014)
- J. Worthen, G. Stadler, **N. Petra**, M. Gurnis, and O. Ghattas. “Towards adjoint-based inversion for rheological parameters in nonlinear viscous mantle flow”, *Physics of the Earth and Planetary Interiors*, 234, pp. 23-34 (2014)
- A. Alexanderian, **N. Petra**, G. Stadler, and O. Ghattas. “A-optimal design of experiments for infinite-dimensional Bayesian linear inverse problems with regularized l_0 -sparsification”, *SIAM J. Sci. Comput.*, 36(5), A2122-A2148 (2014)
- **N. Petra**, H. Zhu, G. Stadler, T. J. R. Hughes and O. Ghattas. “Inversion for basal boundary conditions and rheology parameters in the nonlinear Stokes ice sheet model”. *Journal of Glaciology*, Vol. 58, No. 211, pp. 889-903 (2012)

- **N. Petra**, J. Zweck, S. E. Minkoff, A. A. Kosterev, and J. H. Doty III. “Modeling and design optimization of a resonant optothermoacoustic trace gas sensor”. *SIAM Journal on Applied Mathematics*, vol. 71, no. 1, pp. 309-332 (2011)
- **N. Petra**, J. Zweck, A. A. Kosterev, S. Minkoff, and D. Thomazy. “Theoretical analysis of a quartz-enhanced photoacoustic spectroscopy sensor”, *Applied Physics B: Lasers and Optics*, vol. 94, no. 4, pp. 673-680 (2009)

C. Proceedings and Technical Reports

- T. Hartland, C G. Petra, **N. Petra**, and J. Wang. “Bound-constrained Partial Differential Equation Inverse Problem Solution by the Semi-Smooth Newton Method”, LLNL IM Release number: LLNL-TR-819385 (2021)
- S. Fatehiboroujeni, **N. Petra**, and S. Goyal. “Towards adjoint-based inversion of the Lamé parameter field for slender structures with cantilever loading”, ASME 2016 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, American Society of Mechanical Engineers (2016)
- **N. Petra** and G. Stadler. “Model variational inverse problems governed by partial differential equations”, ICES Report No. 11-05, The Institute for Computational Engineering and Sciences, The University of Texas at Austin (2011)
- **N. Petra**, J. Zweck, S. E. Minkoff, A. A. Kosterev, and J. H. Doty III. “Validation of a Model of a Resonant Optothermoacoustic Trace Gas Sensor”. *Proceedings of the Lasers and Electro-Optics (CLEO) Conference 2011*, Baltimore, Maryland, May 1-6 (2011)
- **N. Petra**, A. A. Kosterev, J. Zweck, S. E. Minkoff, and J. H. Doty III “Numerical and Experimental Investigation of a Resonant Optothermoacoustic Sensor”. *Proceedings of the Lasers and Electro-Optics (CLEO) Conference 2010*, San Jose, California, May 16-21 (2010)
- **N. Petra** and M. K. Gobbert. “Parallel Performance Studies for COMSOL Multiphysics Using Scripting and Batch Processing”. In: Yeswanth Rao, editor, *Proceedings of the COMSOL Conference 2009*, Boston, MA (2009)
- **N. Petra** and M. K. Gobbert. “Performance Studies with COMSOL Multiphysics via Scripting and Batch Processing”. Technical Report number HPCF 2009, UMBC High Performance Computing Facility, University of Maryland, Baltimore County (2009)

4 Support and Awards

2022 J. T. Oden Faculty Fellowship, The University of Texas at Austin

2019 Best Paper Prize, SIAM Activity Group on Computational Science and Engineering, “Scalable and Efficient Algorithms for the Propagation of Uncertainty from Data through Inference to Prediction for Large-scale Problems, with Application to Flow of the Antarctic Ice Sheet,” *Journal of Computational Physics*, 296(1) (2015)

- 2018 NSF Computational Mathematics (\$20,000), “2018 Gene Golub SIAM Summer School: Inverse Problems: Systematic Integration of Data with Models under Uncertainty” (PI)
- 2017-2022 NSF CAREER Award (\$400,000), “Large-Scale Bayesian Inverse Problems Governed by Differential and Differential-Algebraic Equations” (PI)
- 2016-2019 NSF SSI Collaborative Research Award (\$475,000), “Integrating Data with Complex Predictive Models under Uncertainty: An Extensible Software Framework for Large-Scale Bayesian Inversion” (Co-PI)
- 2015 NSF AIP Travel Grant Support (\$1,500) to attend and present my research at the Applied Inverse Problems Conference (**AIP15**), Helsinki, Finland, May 25-29, 2015
- 2015, 2016 Support from the DOE Visiting Faculty Program (VFP) (\$13,000) to spend 10 weeks at Argonne National Laboratory, Lemont, IL, June 08-Aug 14, 2015 and 2016
- 2013 AWM AWM-NSF Travel Grant support (\$1,900) to attend and present my research at the International Conference on Continuous Optimization (**ICCOPT13**), Universidade Nova de Lisboa Caparica, Portugal, July 27-August 1, 2013
- 2013 AWM Workshop Travel Grant support (\$675) to attend and present my research at the AWM Workshop / SIAM Annual Meeting, San Diego, CA, July 8-12, 2013
- 2010 SIAM Postdoc/Early Career Travel Award (\$550) to attend the SIAM Conference on Computational Science and Engineering (**CSE11**), Reno, NV, February 28–March 4, 2011
- 2010-2011 ICES Postdoctoral Fellowship at the Institute for Computational Engineering and Sciences (ICES), The University of Texas at Austin, TX
- 2010 SIAM Student Chapter Certificate of Recognition for outstanding service and contribution to the SIAM Student Chapter at UMBC
- 2007-2010 Research Assistantship (Advisors: Dr. Susan Minkoff and Dr. John Zweck) supported by Mid-InfraRed Technologies for Health and the Environment (MIRTHE), an NSF Engineering Research Center headquartered at Princeton University
- 2009 SIAM Student Travel Grant to represent the UMBC SIAM Student Chapter at the SIAM Annual Meeting, Denver, CO, July 6–10, 2009
- 2009 SIAM Student Travel Grant to attend the South-Eastern Atlantic Mathematical Sciences Workshop 2009, University of Central Florida, Orlando, November 6–8, 2009

5 Professional Activities

A. National and international scientific and professional committees

- Secretary, SIAM Activity Group on Uncertainty Quantification, 2017-2018
- Member, SIAG-GS Nominating Committee, SIAG-UQ Nominating Committee

B. Computational tools development

- Co-developer of `hippylib` (**I**nverse **P**roblem **P**Ython **l**ibrary), a computational sandbox that contains and allows easy extensions of state-of-the-art scalable algorithms for PDE-based deterministic and Bayesian inverse problems in python (open source codes available at: <https://hippylib.github.io>.)
- Co-developer of `VIP-PDE`, a set of model problems for Variational Inverse Problems governed by PDEs implemented in COMSOL with Matlab (2010-present). The technical report and the associated (open source) codes can be downloaded from: <http://users.ices.utexas.edu/~noemi/vippde.html>.

C. Co-organizer of seminars and minisymposia:

- Co-organizer, *Optimization Seminar*, Department of Applied Mathematics, University of California, Merced, 2014-2021
- Minisymposium on “Inverse problems and design of experiments under uncertainty”, at the SIAM Conference on Computational Science and Engineering (**SIAMCSE21**), Forth Worth, TX, March 1-5, 2021. Co-organizers: Alen Alexanderian (NC State)
- Minisymposium on “Advances in Bayesian Inversion in the Geosciences”, at the SIAM Conference on Mathematical and Computational Issues in the Geosciences (**SIAMGS21**), , Italy, June 21-24, 2020. Co-organizers: Omar Ghattas (UT Austin) and Georg Stadler (NYU)
- Minisymposium on “Characterizing model inadequacy in Bayesian inference”, at the SIAM Conference on Uncertainty Quantification (**SIAMUQ18**), Orange County, California, USA, April 16-19, 2018. Co-organizers: Umberto Villa, Todd Oliver, Omar Ghattas, Robert Moser (UT Austin)
- Minisymposium on “Methods for data-driven uncertainty quantification of large-scale complex dynamic systems”, at the SIAM Conference on Computational Science and Engineering (**CSE17**), Atlanta, Georgia, USA, February 27 - March 3, 2017. Co-organizers: Emil Constantinescu (ANL) and Cosmin Petra (LLNL)
- Minisymposium on Recent Advances in Uncertainty Quantification, Joint Mathematics Meeting (**JMM17**), January 6, 2017. Co-organizer: Juan Meza (UC Merced)
- Minisymposium on “Bayesian methods for large-scale geophysical inverse problems”, SIAM Conference on Mathematical and Computational Issues in the Geosciences (**SIAMGS15**), Stanford University, Stanford, California, June 29-July 2, 2015. Co-organizers: Omar Ghattas and Georg Stadler
- Minisymposium on “Advances in Large-scale Forward and Inverse Ice Sheet Modeling” at the SIAM Conference on Computational Science & Engineering (**CSE15**), Salt Lake City, Utah, March 14-18, 2015. Co-organizers: Omar Ghattas, Georg Stadler and Irina Tezaur (Sandia)

- Minisymposium on “Uncertainty quantification for ice sheet models” at the SIAM Conference on Uncertainty Quantification (**SIAMUQ14**), Savannah, Georgia, March 31-April 03, 2014. Co-organizers: Omar Ghattas and Georg Stadler
- Minisymposium on “Computational Methods for Inverse Problems” at the International Conference on Continuous Optimization (**ICCOPT13**), July 27-August 1, 2013, Universidade Nova de Lisboa Caparica, Portugal. Co-organizers: Antoine Laurain (TU Berlin)
- Minisymposium on “Advanced methods for forward and inverse ice sheet modeling” at the SIAM Conference on Computational Science & Engineering (**CSE13**): Boston, MA, February 25-March 1, 2013. Co-organizers: Omar Ghattas and Georg Stadler
- Minisymposium on “Uncertainty quantification for ice sheet models” at the SIAM Conference on Uncertainty Quantification (**SIAMUQ12**): Raleigh, NC, April 2-4, 2012. Co-organizers: Omar Ghattas and Georg Stadler
- Minisymposium on “Boundary Element Methods: Recent Developments and Applications” at the SIAM Annual Meeting (**SIAMAN09**): Denver, CO, July 6-10, 2009. Co-organizer: Dr. Susan Minkoff

D. Conferences and Workshops Organized

- Co-organizer of the “Women in Inverse Problems” workshop at the Banf International Research Station for Mathematical Innovation and Discovery (to be held in December 2021)
- On the organising committee for SIAM Conference of Uncertainty Quantification, March 24-27, 2020, TU Munich, Germany
- Co-organizer, Gene Golub SIAM Summer School on “Inverse Problems: Systematic Integration of Data with Models under Uncertainty”, June 17-30, 2018, Breckenridge, Colorado, USA
- The First-Fourth Central Valley SIAM Student Chapter Conference at the University California, Merced, 2017-2019. Co-organizers: UC Merced student chapter officers and myself as faculty advisor
- Co-organizer, ICERM IdeaLab: *Inverse Problems and Uncertainty Quantification*, Institute for Computational and Experimental Mathematics, Brown University, Providence, RI, July 6-10, 2015
- Co-organizer, The First Chesapeake SIAM Student Chapter Conference at the University of Maryland, Baltimore County (UMBC), April 27, 2010 (Co-organizers: UMBC student chapter officers and faculty adviser Dr. Susan Minkoff)

E. Talks at Conferences, Workshops, Universities and Labs

- *Joint parameter and model dimension reduction for Bayesian ice sheet inverse problems governed by the nonlinear Stokes equations*, American Geophysical Union Conference (**AGU21**), Advances in Data Assimilation, Predictability, and Uncertainty Quantification, December 13-17, 2021
- *hIPPYlib-MUQ: An Extensible Software Framework for Large-Scale Bayesian Inverse Problems Governed by PDEs*, Women in Inverse Problems (**WIP21**), Banff International Research Station for Mathematical Innovation and Discovery (BIRS), December 5-10, 2021

- *Propagation of Uncertainty from Data to Inference for Large-Scale Inverse Problems with Application to Ice Sheet Flow*, New York Scientific Data Summit 2021: Data-Driven Discovery in Science and Industry (online), October 26-29, 2021
- *Fast Methods for Bayesian Inverse Problems with Uncertain PDE Forward Models with Application to Ice Sheet Flow Inverse Problems*, SIAM Conference on Mathematical & Computational Issues in the Geosciences (**SIAMGS21**), Milan, Italy (online), June 21-24, 2021
- *hIPPYlib-MUQ: Scalable Markov Chain Monte Carlo Sampling Methods for Large-scale Bayesian Inverse Problems Governed by PDEs*, 32nd Parallel Computational Fluid Dynamics Conference (**ParCFD21**), Nice, France (online), May 17-19, 2021
- *Optimal Experimental Design for Bayesian Inverse Problems under Model Uncertainty*, SIAM Conference on Computational Science and Engineering (**SIAMCSE21**), Forth Worth, TX, March 1-5, 2021
- *Propagation of Uncertainty from Data to Inference for Large-Scale Inverse Problems with Application to Ice Sheet Flow*, Computational Methods in Water Resources (**CMWR 2020**), Data-centric simulations and modelling, Stanford University, USA, December 14-17, 2020
- *hIPPYlib: An Extensible Software Framework for Large-Scale Inverse Problems Governed by PDEs*, American Geophysical Union Conference (**AGU20**), Open-Source Packages and FAIR Software session, San Francisco, CA, Dec 1-13, 2020
- *Inferring the basal sliding coefficient field for the Stokes ice sheet model under rheological uncertainty*, Numerical Analysis Seminar, Department of Mathematics, NC State, November 3, 2020
- *Optimal design of large-scale Bayesian linear inverse problems under reducible model uncertainty: good to know what you don't know*, Center for Mathematics and Artificial Intelligence, George Mason University, October 16, 2020
- *Inferring the basal sliding coefficient for the Stokes ice sheet model under rheological uncertainty*, Mathematical Modelling in Glaciology, The Banff International Research Station for Mathematical Innovation and Discovery (BIRS), January 12-17, 2020
- *Hierarchical off-diagonal low-rank (HODLR) approximation for Hessians in Bayesian inference with application to ice sheet models*, American Geophysical Union Conference (**AGU19**), San Francisco, CA, Dec 9-13, 2019
- *Statistical treatment of inverse problems constrained by differential equations-based models with stochastic terms*, Neyman Seminar, Department of Statistics, University of California, Berkeley, Dec 4, 2019
- *Optimal control of systems governed by PDEs with random parameter fields*, Seminar, Mechanical Engineering, UC Santa Barbara, CA, April 26, 2019
- *Optimal control of systems governed by PDEs with random parameter fields*, PDE and Applied Math Seminar, Department of Mathematics, UC Davis, CA, April 05, 2019
- *A-Optimal Design of Experiments for Infinite-dimensional Bayesian Inverse Problems*, Stanford Linear Algebra and Optimization Seminar, Stanford University, Institute for Computational and Mathematical Engineering, Stanford, CA, May 04, 2017

- *Mean-variance risk-averse optimal control of systems governed by PDEs with random parameter fields using quadratic approximations*, Optimization Under Uncertainty and Data-Driven Science and Engineering (**OPTDATA17**), Duke University, Durham, NC, April 13-14, 2017
- *Joint Model and Parameter Dimension Reduction for Bayesian Inversion Applied to an Ice Sheet Problem*, SIAM Conference on Computational Science & Engineering (**CSE17**), Atlanta, Georgia, February 27-March 3, 2017
- *Bayesian Inversion Applied to an Ice Sheet Flow Problem and to Power Grid*, SAMSU Program on Optimization (OPT) Opening Workshop, Research Triangle Park, NC, August 29-September 2, 2016
- *hIPPYlib: An Extensible Software Framework for Large-Scale Deterministic and Linearized Bayesian Inverse Problems* SAMSU Summer School, SAMSU, Research Triangle Park, NC, August 8-12, 2016
- *Optimal control of systems governed by PDEs with random parameter fields*, Frontiers in PDE-constrained Optimization, IMA, Minneapolis, June 6-10, 2016
- *Joint Model and Parameter Dimension Reduction for Bayesian Inversion Applied to An Ice Sheet Problem*, SIAM Conference on Uncertainty Quantification (**SIAMUQ16**), Lausanne, Switzerland, April 5-8, 2016
- *A Fast and Scalable Method for A-Optimal Design of Experiments for Infinite-dimensional Bayesian Nonlinear Inverse Problems*, Seismo Lab Seminar at Caltech, Pasadena, CA, Jan 15, 2016
- *A Fast and Scalable Method for A-Optimal Design of Experiments for Infinite-dimensional Bayesian Nonlinear Inverse Problems with Application to Porous Medium Flow*, Joint Mathematics Meetings (**JMM16**), Seattle, WA, Jan 6-9, 2016
- *A Fast and Scalable Method for A-Optimal Design of Experiments for Infinite-dimensional Bayesian Nonlinear Inverse Problems with Application to Porous Medium Flow*, American Geophysical Union (**AGU15**), San Francisco, CA, Dec 14-18, 2015
- *Large-Scale Bayesian Inverse Problems Governed by Differential and Algebraic Equations*, Bay Area Scientific Computing Day (**BASCD15**), Lawrence Berkeley National Laboratory, Berkeley, CA, Dec 11, 2015
- *Large-scale Bayesian inference for nonlinear inverse problems*, Applied Inverse Problems Conference (**AIP15**), Helsinki, Finland, May 25-29, 2015
- *Uncertainty Quantification for Large-Scale Bayesian Inverse Problems with Application to Ice Sheet Models*, SIAM Conference on Computational Science & Engineering (**CSE15**), Salt Lake City, UT, March 13-18, 2015
- *A-optimal design of experiments for infinite-dimensional Bayesian linear inverse problems with regularized l_0 -sparsification*, Optimization Seminar, Department of Applied Mathematics, School of Natural Sciences, University of California, Merced, California, Feb 04, 2015
- *Large-scale Bayesian inversion of the basal friction coefficient for the Antarctic ice sheet (invited talk)*, American Geophysical Union Conference (**AGU14**), San Francisco, CA, Dec 15-19, 2014

- *From data to predictions under uncertainty for Antarctic ice sheet flow*, LANS Informal Seminar Talks, Argonne National Laboratory, Dec 03, 2014
- *Uncertainty Quantification for Large-Scale Bayesian Inverse Problems with Application to Ice Sheet Models*, Sandia Technical Seminar Livermore, California, Nov 05, 2014
- *Coefficient field Bayesian inversion in an elliptic partial differential equation (PDE)*, Optimization Seminar, Department of Applied Mathematics, School of Natural Sciences, University of California, Merced, California, Oct 27, 2014
- *Uncertainty Quantification for Large-Scale Bayesian Inverse Problems with Application to Ice Sheet Models*, SIAM Annual Meeting (**SIAMAN14**), Workshop Celebrating Diversity, Chicago, Illinois, July 7-11, 2014
- *Uncertainty Quantification for Large-Scale Bayesian Inverse Problems with Application to Ice Sheet Models*, SIAM Conference on Uncertainty Quantification (**SIAMUQ14**), Savannah, Georgia, March 31-April 03, 2014
- *Computational Methods for Bayesian Inverse Problems Governed by PDEs*, International Conference on Continuous Optimization (**ICCOPT13**), Universidade Nova de Lisboa Caparica, Portugal, July 27-August 1, 2013
- *Uncertainty Quantification for Large-scale Bayesian Inverse Problems with Application to Ice Sheet Models*, **AWM Workshop** at the SIAM Annual Meeting (**SIAMAN13**), San Diego, CA, July 8-12, 2013. *This talk was selected to be presented in the **Mathematics of Planet Earth (MPE)** session by the AWM selection committee.*
- *A Stochastic Newton MCMC Method with Application to Inverse Problems Governed by Ice Sheet Flows*, SIAM Conference on Computational Science & Engineering (**CSE13**), Boston, Massachusetts, February 25-March 1, 2013
- *A Stochastic Newton MCMC Method with Applications to Ice Sheet Inverse Problems*, American Geophysical Union Conference (**AGU12**), San Francisco, CA, Dec 3-9, 2012
- *The Estimation of Uncertainty in the Solution of Ice Sheet Inverse Problems: Gaussian Approximation versus the Stochastic Newton MCMC Method*, SIAM Annual Meeting (**SIAMAN12**), Minneapolis, MN, July 10, 2012
- *Quantification of the Uncertainty in the Basal Sliding Coefficient in Ice Sheet Models*, SIAM Conference on Uncertainty Quantification (**SIAMUQ12**), Raleigh, NC, April 04, 2012
- *Uncertainty Quantification for Ice Sheet Inverse Problems*, American Geophysical Union's Fall Meeting (**AGU11**), San Francisco, CA, Dec 05, 2011
- *Advanced Ice Sheet Modeling: Scalable Parallel Adaptive Full Stokes Solver and Inversion for Basal Slipperiness and Rheological Parameters*, World Climate Research Programme Conference (**WCRP11**), Denver, CO, Oct 24-28, 2011
- *Newton Methods for Inverse Problems Governed by Nonlinear Stokes Models of Ice Sheet Flows*, Laboratory for Advanced Numerical Simulations (LANS) Seminar, **Argonne**, August 24, 2011
- *Gauss-Newton Methods for Inverse Problems Governed by Nonlinear Full Stokes Models of Ice Sheet Flows*, 7th International Congress on Industrial and Applied Mathematics (**ICIAM11**), Vancouver, BC, Canada, July 18-22, 2011

- *Newton Methods for Inverse Problems Governed by Nonlinear Full Stokes Models of Ice Sheet Flows*, Applied Inverse Problems Conference (**AIP11**), Texas A&M University, College Station, TX, May 23–27, 2011
- *Adjoint Methods for Inversion of Rheology Parameters in Ice Sheet Flows*, SIAM Conference on Computational Science and Engineering (**CSE11**), Reno, NV, February 28–March 04, 2011
- *Numerical and Experimental Investigation for a Resonant Optoacoustic Sensor*, Conference on Lasers and Electro-Optics (**CLEO10**), San Jose, CA, May 16–21, 2010, paper CMJ6.
- *Application of the Boundary Element Method in Photoacoustic Spectroscopy*, SIAM Annual Meeting (**SIAMAN09**), Denver, CO, July 6-10, 2009
- *Computational Modeling of a Quartz Enhanced Photoacoustic Spectroscopy (QEPAS) Sensor*, **SIAM** Conference on Mathematics for Industry, Philadelphia, Pennsylvania, October 9–11, 2007
- *Models of Quartz-Enhanced Photoacoustic Spectroscopy (QEPAS) and Resonant Optoacoustic (ROTADÉ) Sensors*, South-Eastern Atlantic **Mathematical Sciences Workshop**, University of Central Florida, Orlando, November 6–8, 2009
- *Computational Modeling of Quartz-Enhanced Optothermal, Spectroscopy Sensors*, Graduate Research Conference, University of Maryland, Baltimore County, April 24, 2009
- *Theoretical Analysis of a Quartz-Enhanced Photoacoustic Spectroscopy Sensor*, **Differential Equation Seminar**, University of Maryland, Baltimore County, December 01, 2008
- *Theoretical Analysis of Quartz-Enhanced Photoacoustic Spectroscopy (QEPAS) and Resonant Optoacoustic (ROTADÉ) Sensors*, at several **MIRTHE** Summer Workshops during 2007–2010
- *Models of QEPAS and ROTADÉ Sensors*, **NSF-ERC MIRTHE Start-up** Site Visit Review, November 14–15, 2006 and at various NSF MIRTHE Site Visits, Princeton University during 2007–2010

F. Professional Trainings/Workshops attended and participated

- *Summer Course on PDE-Constrained Optimization*, Universidade Nova de Lisboa Caparica, Portugal, July 27-August 1, 2013. **Topics covered include:** existence of solutions, optimality conditions, and efficient optimization methods
- *Uncertainty Quantification Summer School*, University of Southern California, Los Angeles, CA, USA, August 22–24, 2012. **Topics covered include:** Polynomial Chaos based uncertainty propagation: intrusive and non-intrusive methods, Bayesian methods for large-scale inverse problems, etc.
- *The First (annual) CESM Uncertainty Quantification and Analysis (UQA) Interest Group Meeting*, NCAR’s Mesa Laboratory, Boulder, CO, USA, January 30–31, 2012
- *Texas Advanced Computing Center (TACC) Training: Introduction to PETSc*, Austin, TX, USA, January 17, 2012

- *Uncertainty Quantification for Complex Systems*, by Tony O’Hagan, ICES UT-Austin, Austin, TX, October 03-04, 2011
- *Texas Advanced Computing Center (TACC) 5th Annual 1-week Summer Supercomputing Institute*, Austin, TX, August 01–05, 2011. **Topics covered include:** HPC, Scientific Visualisation (with ParaView, VisIt, Vapor), OpenMP, MPI, Scientific Computing Tools and Libraries (AMR, PETSc, Trilinos, FEniCS, etc.)

G. Reviewer

- SIAM Journal of Scientific Computing (**SISC**), SIAM/ASA Journal on Uncertainty Quantification (**JUQ**), Journal of Computational Physics (**JCP**), Journal of Inverse Problems (**IP**), ACM Transactions on Mathematical Software (**ACM TOMS**), Journal of Computational Geosciences, Journal of Transport in Porous Media, Cryosphere, IEEE Transactions on Power Systems, National Science Foundation (**NSF**) panel, Air Force Office of Scientific Research (AFOSR), The International Conference for High Performance Computing (**SC16**), The Swiss Platform for Advanced Scientific Computing (**PASC16**) conference

H. Professional Memberships

- American Mathematical Society (**AMS**), Society for Industrial and Applied Mathematics (**SIAM**), Association for Women in Mathematics (**AWM**), American Geophysical Union Society (**AGU**)

6 Diversity Activities

- Member of the SIAM-AWM Committee (September 1, 2022 - January 31, 2025)
- Author of the “WIP: Women in Inverse Problems” slack workspace
- Co-organizer of the “Women in Inverse Problems” workshop at the Banf International Research Station for Mathematical Innovation and Discovery (December 2021).
- Webmaster of the “WIP: Women in Inverse Problems AWM Advance Research Network” website (hosted by AWM ADVANCE).
- Mentor for the National Alliance for Doctoral Studies in the Mathematical Sciences (Math Alliance)
- Participated as panelist in the UC Merced Women in Science, Technology, Engineering, and Math (WSTEM) panel discussion on “Tenure, sabbatical or leave” (November 2020).
- Participated in the “Dinner with a scientist” event that connects high school girls with female scientists organized by the University of California, Merced, October 6, 2015.
- Initiated the UC Merced Association for Women in Mathematics (AWM) institutional membership in collaboration with Dr. Suzanne Sindi (February 2015).
- Mentor and poster judge at the Association for Women in Mathematics (AWM) workshop at the SIAM Conference on Computational Science & Engineering (**CSE15**), Salt Lake City, UT, March 13-18, 2015.
- Given a talk at the Workshop Celebrating Diversity, SIAM Annual Meeting (**SIAMAN14**), Chicago, Illinois, July 7-11, 2014.