OMAR GHATTAS

John A. and Katherine G. Jackson Chair in Computational Geosciences
Professor of Geological Sciences, Jackson School of Geosciences
Professor of Mechanical Engineering, Cockrell School of Engineering
Director, Center for Computational Geosciences and Optimization
Oden Institute for Computational Engineering and Sciences
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Contents

1 Biographical data

A. Education:

- B.S.E., Department of Civil Engineering, Duke University, Durham, North Carolina, 1984
- M.S. Computational Mechanics, Department of Civil and Environmental Engineering, Duke University, Durham, North Carolina, 1986 (Mrinmay Biswas, mentor)
- Ph.D. Computational Mechanics, Department of Civil and Environmental Engineering, Duke University, Durham, North Carolina, 1988 (Robert J. Melosh, mentor)

B. Current Positions and Appointments:

- John A. and Katherine G. Jackson Chair in Computational Geosciences, The University of Texas at Austin, 9/05–
- Professor of Geological Sciences, Jackson School of Geosciences, The University of Texas at Austin, 9/05–
- Professor of Mechanical Engineering, Cockrell School of Engineering, The University of Texas at Austin, 9/05–

- Director of the Center for Computational Geosciences, Oden Institute for Computational Engineering and Sciences, The University of Texas at Austin, 9/05–
- Core faculty member, Computational Science, Engineering, & Mathematics (CSEM) Ph.D. program, Oden Institute, 9/05–
- Professor (by courtesy), Department of Biomedical Engineering, The University of Texas at Austin, 9/05–
- Professor (by courtesy), Department of Computer Science, The University of Texas at Austin, 9/05–
- Research Professor, Institute for Geophysics, The University of Texas at Austin, 9/05–
- Co-PI, PSAAP Center for Predictive Engineering and Computational Science, 03/08–04/14
- Director, KAUST–UT Austin Academic Excellence Alliance, 01/08–12/15
- Co-Chief Applications Scientist, Texas Advanced Computing Center (TACC) Ranger System, 10/06–09/13

C. Former Positions and Appointments:

- Adjunct Professor, Department of Civil and Environmental Engineering, Carnegie Mellon University, 9/05–9/06
- Professor, Department of Biomedical Engineering, Carnegie Mellon University, 7/02–8/05
- Professor, Department of Civil and Environmental Engineering, Carnegie Mellon University, 7/01–8/05
- Visiting Scientist, Institute for Scientific Computing Research, Lawrence Livermore National Laboratory, Livermore, CA, multiple visits, 3/01–10/03
- Visiting Scientist, Computer Science Research Institute, Sandia National Laboratories, Albuquerque, NM, multiple visits, 08/99–present
- Associate Professor, Biomedical and Health Engineering, Carnegie Mellon University, Pittsburgh, PA, 12/99–6/01
- Associate Professor with Tenure, Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA, 7/98–6/01
- Visiting Scientist, Institute for Computer Applications in Science and Engineering, NASA Langley Research Center, Hampton, VA, 7/97–8/97
- Associate Professor, Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA, 7/94–6/98
- Affiliated faculty, Robotics Institute, School of Computer Science, Carnegie Mellon University, Pittsburgh, PA, 5/93–8/05
- Affiliated faculty, Biomedical Engineering Program, Carnegie Mellon University, Pittsburgh, PA, 9/92–12/99
- Affiliated faculty, Engineering Design Research Center/Institute for Complex Engineered Systems, Carnegie Mellon University, Pittsburgh, PA, 5/90–8/05
- Assistant Professor, Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA, 8/89–6/94
- Post-Doctoral Research Associate, Department of Civil and Environmental Engineering, Duke University, Durham, NC, 1/89–7/89 (Peter K. Haff, mentor)

D. Consulting Assignments:

- Member of the Technical Advisory Board and consultant to the development group, Algor, Inc., 150 Beta Drive, Pittsburgh, PA 15238, 5/93–5/98.

2 Teaching and Education

A. Courses Taught at UT-Austin:

(overall averages: 4.8 instructor, 4.6 course, out of 5.0)

Number	Title	Units	Class	Size	Offered	Course	Instr
ME-397/CAM-397	Optimization of PDEs	3	Gr	12	S06	4.2	4.5
GEO-391	Comp Methods for Geophysics	3	Gr	6	F06	5.0	5.0
ME-397/CAM-397	Optimization of PDEs	3	Gr	11	F07	4.6	4.6
CAM-397	Comp and Var Inverse Problems	3	Gr	16	S11	4.8	4.8
CSE-397/GEO-391/ME-397	Comp and Var Inverse Problems	3	Gr	18	S12	4.5	4.4
GEO-384F	Comp Methods for Geophysics	3	Gr	7	S13	4.0	4.6
CSE-397/GEO-391/ME-397	Comp and Var Inverse Problems	3	Gr	15	S14	4.9	4.9
GEO-384F	Comp Methods for Geophysics	3	Gr	6	F14	4.4	5.0
CSE-397/GEO-391/ME-397	Comp and Var Inverse Problems	3	Gr	25	F15	4.7	4.8
GEO-384F	Finite Elem Meth in Geophysics	3	Gr	6	F16	4.8	5.0
CSE-397/GEO-391/ME-397	Comp and Var Inverse Problems	3	Gr	33	F17	4.8	4.9
GEO-384F	Finite Elem Meth in Geophysics	3	Gr	14	F18	4.7	5.0
CSE-397/GEO-391/ME-397	Comp and Var Inverse Problems	3	Gr	44	F19	4.8	4.9
GEO-384F	Finite Elem Meth in Geophysics	3	Gr	12	F20	4.5	4.6

Note: on leave from the academic budget, Jan 2008–Dec 2012 while serving as director of KAUST-UT Academic Excellence Alliance.

B. Courses Taught at CMU:

(4.39 lifetime instructor average)

Number	Title	Units	Class	Size	Offered	FCE–Course	FCE–Instr.
12-701	Opt & Mod CivE Syst	9	Gr	12	F89	4.58	4.42
12-621	Structural Mech II[b]	9	Jr,Sr	7	S90	4.00	4.17
12-759	Adv Tpc Design Opt[a]	9	Gr	4	S90	4.50	4.50
12-755	Finite Elem Mech I	9	Gr	10	F90	4.40	4.50
12-621	Structural Mech II	9	Jr,Sr	21	S91	4.00	3.76
12-756	Finite Elem Mech II[a,b]	9	Gr	12	S91	4.75	4.63
12-755	Finite Elem Mech I	9	Gr	15	F91	4.43	4.50
12-212	Solid Mechanics	12	Soph	43	S92	3.45	3.13
12-759	Optimization in Mech[a]	9	Gr	7	S92	4.75	4.75
12-755	Finite Elem Mech I	9	Gr	11	F92	4.62	4.50
12-325	Soil Mechanics[b]	12	Jr	33	S93	3.48	3.57
12-212	Solid Mechanics	12	Soph	40	S93	4.30	4.23
12-755	Finite Elem Mech I	12	Gr	13	F93	4.31	4.38
12-756	Finite Elem Mech II	9	Gr	8	S94	4.50	4.63
12-647	Jr. Project Seminar	3	Jr	29	S94	–	–
12-755	Finite Elem Mech I	9	Gr	17	F94	4.87	4.73
12-759	Optimization in Mech	9	Gr	9	S95	4.56	4.78
12-755	Finite Elem Mech I	9	Gr	17	F95	4.88	4.81
12-235	Statics	9	Soph	37	S96	4.47	4.41
12-755	Finite Elem Mech I	12	Gr	16	F96	4.25	4.38
12-759	Optimization in Mech	12	Gr	8	S97	4.75	4.88
12-755	Finite Elem Mech I	12	Gr	27	F97	4.64	4.60
12-756	Finite Elem Mech II[a]	12	Gr	14	S98	4.33	4.50
12-755	Finite Elem Mech I	12	Gr	5	F98	5.00	5.00
12-355	Fluid Mechanics	9	Jr	34	S99	2.67	3.08
12-755	Finite Elem Mech I	12	Gr	19	F99	4.74	4.79
12-355	Fluid Mechanics	9	Jr	19	S00	4.33	4.50
12-755	Finite Elem Mech I	12	Gr	9	F01	4.97	4.98
12-271	Comp Appl in CEE[b]	9	Soph	26	F01	4.19	4.00
12-704	Prob & Estim Methods	12	Gr	21	F02	4.28	4.33
12-768	Comp Biofluid Dynam[a]	12	Gr	10	S03	4.72	4.72
12-759	Optimization of PDEs[a]	12	Gr	16	F03	4.00	4.00
42-705	Var Image Processing[a]	12	Gr	5	F04	4.50	5.00
12-355	Fluid Mechanics	9	Jr	22	S05	4.12	4.62

a. new course

b. team taught

C. Student Projects

a. Thesis Master's Students

1. Tadaji Wakabayashi, Computational efficiency and storage requirements for the hierarchical and simultaneous methods in structural optimization, June 1990.

2. Shyan-Ching Jang, Computational strategies for large-scale structural inverse problems, September 1990.
3. Pei-Chi Huang, Range and null space finite element methods for viscous incompressible flow, August 1991.
4. Susan Schrader, Topological and discrete-sizing optimal design of trusses, August 1991.
5. Jai-Hyeong Bark, Topological optimization of continua, December 1992.
6. Weiyue Lee, Truncated–Newton methods for shape optimization of solids, December 1992 (M.S. project).
7. Christopher Visnic, Mechanical consequences of press fitting an uncemented acetabular implant, May 1994 (co-advised with B. Jaramaz).
8. Madhavi Vuppalapati, A Poisson element in FeLT, September 1994 (M.S. project).
9. Sameer Shah, Fictitious domain methods for elasticity problems and applications to problems in biomechanics, May 1996.
10. George Biros, 2D contour smoothing and surface reconstruction of tubular CT-scanned anatomical structures, December 1996 (co-advised with B. Jaramaz).
11. Larisa Goldmints, Biomechanics of press-fit acetabular component in total hip replacement: Idealized 3-D model, May 1997, (co-advised with B. Jaramaz).
12. Ivan Malcevic, Parallel shape optimization for large-scale problems, May 1997.
13. Volkan Akcelik, Orthogonal grid generation for anatomic structures, May 1998 (co-advised with B. Jaramaz).
14. Jianlin Wang, Octree-based finite element method for elastic wave propagation with application to earthquake ground motion, May 1999 (co-advised with J. Bielak).
15. Ioannis Epanomeritakis, A study of the seismic inverse problem for a layer on a halfspace, May 1999 (co-advised with J. Bielak).
16. Anurag Gupta, The Green-Galerkin Method: A New Meshfree Approach to Boundary Value Problems, May 1999 (co-advised with J. Bielak).
17. Eiris Boerner, A Finite Element Method for Incompressible Finite Elasticity, with Application to Red Blood Cell Deformation, April 2002 (M.S. awarded by Chalmers University, research conducted at CMU).
18. Jenny Berschling, Parameter identification for variably saturdated flow through heterogeneous porous media, May 2003 (co-advised with V. Akçelik).
19. Ge Gao, hIPPYLearn: An inexact Newton-CG method for training neural networks with analysis of the Hessian, May 2017 (co-advised with U. Villa).
20. Di Liu, hIPPYLearn: An inexact stochastic Newton-CG method for training neural networks, May 2017 (co-advised with U. Villa).
21. Haocheng An, Kalman filtering for state estimation of an advection diffusion PDE from sparse observations, August 2019

b. Ph.D. Students

BME = Biomedical Engineering degree, CMU
CM = Computational Mechanics degree, CMU

CS&E = Computational Science and Engineering degree, CMU
CAM = Computational and Applied Mathematics degree, UT-Austin
CSEM = Computational Science, Engineering, and Mathematics degree, UT-Austin

1. Carlos Orozco (CM), Large-scale shape optimization: Numerical methods, parallel algorithms, and applications to aerodynamic design, May 1993. Currently Associate Professor, Department of Engineering Technology, University of North Carolina-Charlotte.
2. Xiaogang Li (CM), A variational finite element method for fully-coupled nonlinear fluid-solid interaction, December 1995. Currently software development engineer, ANSYS, Inc., Pittsburgh, PA.
3. Jai-Hyeong (Jay) Bark (CM), Optimal velocity control of Navier-Stokes flows, with applications to viscous drag reduction, December 1995. Currently Senior Lecturer, Department of Architectural Engineering, Mokwon University, Taejon, Korea.
4. Beichang (Bert) He (CM), Shape optimization of Navier-Stokes flows, with application to design of artificial heart devices, May 1996. Currently member of the technical staff, Engineering Mechanics Laboratory, GE Global Research, Niskayuna, NY.
5. Jifeng Xu (CM), Three-dimensional simulations of wave propagation in inelastic media on parallel computers with application to seismic response, January 1998. Currently Senior Technical Fellow, Aeronautical Science & Technology Research Institute of COMAC, Beijing. (co-advised with J. Bielak)
6. Hesheng Bao (CM), Finite element simulation of earthquake ground motion in realistic basins, February 1998. Currently Technical Manager, Management Science Associates, Pittsburgh, PA. (co-advised with J. Bielak)
7. George Biros (CS&E), Parallel Lagrange-Newton-Krylov-Schur methods for PDE-constrained optimization, with application to optimal control of viscous flows, September 2000. Currently Moncrief Chair in Simulation-Based Engineering & Sciences, and Professor, Institute for Computational Engineering & Sciences and Mechanical Engineering, The University of Texas at Austin.
8. Ivan Malcevic (CS&E), A parallel dynamic mesh Lagrangian method for Navier Stokes flows with deformable boundaries, May 2001. Currently member of the technical staff, Engineering Mechanics Laboratory, GE Global Research, Niskayuna, NY.
9. Volkan Akçelik (CS&E), Multiscale Newton-Krylov methods for inverse acoustic wave propagation, (co-advised with B. Jaramaz), February 2002. Currently senior scientist, ExxonMobil Research and Engineering Company.
10. Euijoong Kim (CS&E), Parallel octree-based multiresolution mesh method for large-scale earthquake ground motion simulation, (co-advised with J. Bielak), January 2003. Chief Technology Officer, Hanwha Corporation, Korea.
11. Larisa Goldmints (CS&E), Fast automated image-based patient-specific biomechanical modeling (co-advised with B. Jaramaz), May 2003. Currently at GE Energy.
12. Clemens Kadow (CS&E), Parallel Delaunay refinement mesh generation, (co-advised with G. Blelloch, G. Miller, and N. Walkington), May 2004. Currently with McKinsey & Company.
13. Judith Hill (CS&E), Phase field methods for flows with elastic membranes, (co-advised with N. Walkington), May 2004. Currently Section Head, National Center for Computational Sciences, Oak Ridge National Laboratory.

14. Ioannis Epanomeritakis (CS&E), Elastic inversion for earthquake ground motion modeling, (co-advised with J. Bielak), September 2004. Currently Lecturer, Computer Science Department, University of Crete.
15. Alexandre Cunha (CS&E), A fully Eulerian method for shape optimization with application to Navier-Stokes flows, September 2004. Currently Computational Scientist and Director, Center for Advanced Methods in Biological Image Analysis, Caltech.
16. Ioanna Pagani (BME), Subcellular Localization of Cytoskeletal and Transmembrane Proteins of the Human Erythrocyte (co-advised with P. LeDuc), January 2006. Currently Staff Scientist, Thermo Fisher Scientific.
17. Aysegul Askan (CS&E), Full waveform inversion for seismic velocity and anelastic losses in heterogeneous structures, (co-advised with J. Bielak), September 2006. Currently Associate Professor, Civil Engineering Department, Middle East Technical University, Turkey.
18. Shan Yang (CSEM), A shape Hessian-based analysis of roughness effects on fluid flows (co-advised with R. Moser), August 2011. Currently Principal Data Scientist, Microsoft.
19. Jennifer Worthen (CSEM), Inverse Problems in Mantle Convection: Models, Algorithms, and Applications, December 2012. Product manager, Emerson Automation Solutions.
20. Jamie Bramwell (CSEM), A discontinuous Petrov-Galerkin method for seismic tomography problems (co-advised with L. Demkowicz), May 2013. Currently Computational Engineer, Lawrence Livermore National Laboratory.
21. H. Pearl Flath (CSEM), Hessian-based response surface approximations for uncertainty quantification in large-scale statistical inverse problems, with applications to groundwater flow, August 2013. Currently Data Scientist, Schlumberger.
22. Tobin Isaac (CAM), Scalable, Adaptive Methods for Forward and Inverse Problems in Continental-Scale Ice Sheet Modeling (co-advised with G. Stadler), June 2015. Currently, Assistant Professor, School of Computational Science and Engineering, Georgia Tech.
23. James Martin (CSEM), A Computational Framework for the Solution of Infinite-Dimensional Bayesian Inverse Problems with Application to Global Seismic Inversion, July 2015.
24. Hongyu (Alice) Zhu (CSEM), Inverse problems for thermomechanically-coupled ice sheet dynamics (co-advised with T.J.R. Hughes and G. Stadler), July 2017. Currently Senior Research Engineer, United Technologies Research Center, Hartford, CT.
25. Benjamin Crestel (CSEM), Advanced techniques for multi-source, multi-parameter, and multi-physics inverse problems (co-advised with G. Stadler), September 2017. Currently Research Scientist, Element AI, Montreal, Canada.
26. Johann Rudi (CSEM), Global Convection in Earth's Mantle: Advanced Numerical Methods and Extreme-Scale Simulations (co-advised with G. Stadler), August 2018. Currently Wilkinson Postdoctoral Fellow, Argonne National Laboratory.
27. Nicholas Alger (CSEM), Data-Scalable Hessian Preconditioning for Distributed Parameter PDE-Constrained Inverse Problems (co-advised with T. Bui-Thanh), May 2019. Currently postdoctoral fellow, UT Austin.
28. Amal Alghamdi (CSEM), *Bayesian Inverse Problems for Quasi-Static Poroelasticity with Application to Ground Water Aquifer Characterization from Geodetic Data* (co-advised with M. Hesse), May 2020. Currently postdoctoral fellow, UT Austin.
29. Thomas O'Leary-Roseberry (CSEM), *Efficient and Dimension Independent Methods for Neural Network Surrogate Construction and Training*, August 2020 (co-advised with P. Heimbach). Currently postdoctoral fellow, UT-Austin.

30. Joshua Chen (CSEM)
31. Keyi Wu (Mathematics)
32. Bassel Saleh (CSEM)
33. Dingcheng Luo (CSME)
34. Shuai Yan (Geo) (Academic advisor; Don Blankenship research advisor)
35. Mathew (Shiting) Hu (CSEM)

D. Postdoctoral Fellows/Research Staff Mentored

1. Loukas Kallivokas, 5/95–8/97. Currently Professor, Department of Civil, Architectural, & Environmental Engineering, University of Texas, Austin.
2. Volkan Akçelik, 4/02–7/04. Currently senior scientist, ExxonMobil Upstream Research.
3. Eui Joong Kim, 1/03–12/03. Currently at Samsung.
4. Judith Hill, 5/04–8/05. Currently Scientific Computing Group Leader, National Center for Computational Sciences, Oak Ridge National Laboratory.
5. Clemens Kadow, 5/04–8/04. Currently with McKinsey & Company.
6. Alexandre Cunha, 9/04–8/05. Currently computational scientist, Center for Advanced Computational Research, Caltech.
7. Carsten Burstedde, 5/06–9/11. Currently, Associate Professor, Institute for Numerical Simulation, University of Bonn, Germany.
8. Seong-Won Na, 6/06–6/07. Currently Chief Engineer, Nuclear Team, Hyundai Engineering Co. Ltd.
9. Lucas Wilcox, 8/06–6/10. Currently, Associate Professor, Department of Applied Mathematics, Naval Postgraduate School.
10. Georg Stadler, 9/06–8/14. Currently Full Professor, Courant Institute of Mathematical Sciences, New York University.
11. Tan Bui-Thanh, 6/08–8/13. Currently, Associate Professor, Aerospace Engineering & Engineering Mechanics, University of Texas at Austin.
12. Noémi Petra, 9/10–8/14. Currently Associate Professor, Applied Mathematics, University of California, Merced.
13. Hari Sundar, 11/12–7/14. Currently Associate Professor, School of Computing, University of Utah.
14. Alen Alexanderian, 8/12–7/15. Currently Assistant Professor, Department of Mathematics, North Carolina State University.
15. Pearl Flath, 9/13–3/14. Currently Data Scientist, Molex.
16. Hejun Zhu, 10/13–7/15. Currently, Assistant Professor of Geosciences, University of Texas at Dallas. (with S. Fomel)
17. Umberto Villa, 3/15–7/18. Currently Research Assistant Professor, Department of Electrical and Systems Engineering, Washington University, St. Louis.
18. James Martin, 9/15–1/16
19. Jeonghun John) Lee, 8/16–8/18. Currently, Assistant Professor, Mathematics, Baylor University.

20. Hossein Aghakhani, 11/16–08/18. Currently at CGG U.S. Imaging.
21. Li Dong, 9/17–7/18. Currently, Data Scientist, eBay.
22. Eldar Khattatov, 5/18–7/19. Currently Quantitative Analyst, Citibank.
23. Ilona Ambartsumyan, 5/18–12/19. Currently Quantitative Researcher, Citadel Securities
24. Qiwei Zhan, 6/19–8/20. Currently Assistant Professor of Electrical Engineering, Zhejiang University.
25. Amal Alghamdi, 6/20–
26. Peng Chen, 9/15–
27. Nick Alger, 6/19–
28. Longfei Gao, 11/19–
29. Thomas O'Leary-Roseberry, 9/20–

3 Publications

Link to Google Scholar page

A. Books

1. D. Higdon, R. Axtell, V. Balaji, K. Calvin, K. Carley, R. Castano, R. Coifman, O. Ghattas, J. Hansen, A. Michalak, S. Shekhar, S. Wang, *From Maps to Models: Augmenting the Nation's Geospatial Intelligence Capabilities*, National Academies Press, 2016.
http://dx.doi.org/10.17226/23650
2. M. Adams, D. Higdon, J. Berger, D. Bingham, W. Chen, R. Ghanem, O. Ghattas, J. Meza, E. Michielssen, V. Nair, C. Nakhleh, D. Nychka, S. Pollock, H. Stone, A. Wilson, M. Zika, *Assessing the Reliability of Complex Models: Mathematical and Statistical Foundations of Verification, Validation, and Uncertainty Quantification*, The National Academies Press, 2012.
http://dx.doi.org/10.17226/13395
3. L. Biegler, G. Biros, O. Ghattas, M. Heinkenschloss, D. Keyes, B. Mallick, Y. Marzouk, L. Tenorio, B. van Bloemen Waanders, and K. Willcox (eds), *Large Scale Inverse Problems and Quantification of Uncertainty*, John Wiley & Sons, 2011.
http://www.wiley.com/WileyCDA/WileyTitle/productCd-0470697431.html
4. J.T. Oden, O. Ghattas, J.L. King, et al., "Report of the NSF Advisory Committee for Cyberinfrastructure Task Force on Grand Challenges," March 2011.
http://www.nsf.gov/od/oci/taskforces/TaskForceReport_GrandChallenges.pdf
5. L. Biegler, O. Ghattas, M. Heinkenschloss, D. Keyes, and B. van Bloemen Waanders (eds), *Real-time PDE-Constrained Optimization*, SIAM series on Computational Science and Engineering, SIAM, 2007.
http://dx.doi.org/10.1137/1.9780898718935
6. L. Biegler, O. Ghattas, M. Heinkenschloss, and B. van Bloemen Waanders (eds), *Large-Scale PDE-Constrained Optimization*, Lecture Notes in Computational Science and Engineering, Springer-Verlag, 2003.
http://www.springer.com/mathematics/computational+science+engineering/book/978-3-540-050

B. Refereed Publications

7. K. Willcox and O. Ghattas, The imperative of physics-based modeling and inverse theory in the future of computational science, *Nature Computational Science*, submitted, 2020.
8. T. O'Leary-Roseberry, U. Villa, P. Chen, O. Ghattas, Derivative-Informed Projected Neural Networks for High-Dimensional Parametric Maps Governed by PDEs, 2020. https://arxiv.org/abs/2011.15110
9. Ki-Tae Kim, Umberto Villa, Matthew Parno, Noemi Petra, Youssef Marzouk, and Omar Ghattas, hIPPYlib-MUQ: Scalable Markov Chain Monte Carlo Sampling Methods for Large-scale Bayesian Inverse Problems Governed by PDEs, submitted, 2020.
10. K. Wu, P. Chen, O. Ghattas, A fast and scalable computational framework for large-scale and high-dimensional Bayesian optimal experimental design, 2020. http://arxiv.org/abs/2010.15196
11. P. Chen, K. Wu, and O. Ghattas, Bayesian inference of heterogeneous epidemic models: Application to COVID-19 spread accounting for long-term care facilities, submitted, 2020. https://arxiv.org/abs/2011.01058
12. Siddhant Wahal, Eldar Khattatov, Jeonghun Lee, Xiao-Hui Wu, Thomas C Halsey, Omar Ghattas, and George Biros, Inferring fault transmissibilities from production data: a Bayesian approach, submitted, 2020.
13. P. Chen and O. Ghattas, Taylor approximation for chance constrained optimization, 2020. https://arxiv.org/abs/2011.09985
14. L. Cao, O. Ghattas, and J.T. Oden, A globally convergent modified Newton method for the direct minimization of the Ohta-Kawasaki energy with application to the directed self-assembly of diblock copolymers, submitted, 2020. https://arxiv.org/abs/2010.15271
15. P. Chen, M.R. Haberman, and O. Ghattas, Optimal design of acoustic metamaterial cloaks under uncertainty, *Journal of Computational Physics*, to appear, 2021. https://arxiv.org/abs/2007.13252
16. T. O'Leary-Roseberry and O. Ghattas, Ill-posedness and optimization geometry for nonlinear neural network training, submitted, 2020. https://arxiv.org/abs/2002.02882
17. T. O'Leary-Roseberry, N. Alger, and O. Ghattas, Low rank saddle free Newton: Algorithm and analysis, submitted, 2020. https://arxiv.org/abs/2002.02881
18. 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, *Transactions on Mathematical Software* (TOMS), to appear, 2020. http://arxiv.org/abs/1909.03948
19. T. O'Leary-Roseberry, N. Alger, O. Ghattas, Inexact Newton Methods for Stochastic Non-Convex Optimization with Applications to Neural Network Training, submitted. https://arxiv.org/abs/1905.06738
20. P. Chen and O. Ghattas, Sparse polynomial approximations for affine parametric saddle point problems, submitted. https://arxiv.org/abs/1809.10251

21. P. Chen and O. Ghattas, Sparse polynomial approximation for optimal control problems constrained by elliptic PDEs with lognormal random coefficients, submitted.
https://arxiv.org/abs/1903.05547

22. P. Chen, O. Ghattas, Stein variational reduced basis Bayesian inversion, submitted, 2020.
http://arxiv.org/abs/2002.10924

23. P. Chen and O. Ghattas, Projected Stein variational gradient descent, *NeurIPS 2020*, December 2020.
https://proceedings.neurips.cc/paper/2020/file/14faf969228fc18fcd4fcf59437b0c97-Paper.pdf
https://arxiv.org/abs/2002.03469

24. N. Alger, P. Chen, O. Ghattas, Tensor train construction from tensor actions, with application to compression of large high order derivative tensors, *SIAM Journal on Scientific Computing*, to appear, 2020.
https://arxiv.org/abs/2002.06244

25. D. Stanzione, J. West, R. Evans, T. Minyard, O. Ghattas, D. Panda, Frontera: The Evolution of Leadership Computing at the National Science Foundation, *Practice and Experience in Advanced Research Computing (PEARC20)*, Association for Computing Machinery, 106–111, July 2020.
https://dl.acm.org/doi/abs/10.1145/3311790.3396656

26. A. Alghamdi, M. Hesse, J. Chen, O. Ghattas, Bayesian Poroelastic Aquifer Characterization from InSAR Surface Deformation Data. Part I: Maximum A Posteriori Estimate, *Water Resources Research*, 56:e2020WR027391, 2020.
http://arxiv.org/abs/2002.10706
https://doi.org/10.1029/2020WR027391

27. I. Ambartsumyan, W. Boukaram, T. Bui-Thanh, O. Ghattas, D. Keyes, G. Stadler, G. Turkiyyah, and S. Zampini, Hierarchical Matrix Approximations of Hessians Arising in Inverse Problems Governed by PDEs, *SIAM Journal on Scientific Computing*, 42(5):A3397–A3436, 2020.
https://doi.org/10.1137/19M1270367
http://arxiv.org/abs/2003.10173

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4 Grants and Contracts

A. Awarded to date

1. R. Moser (PI), G. Biros (Co-PI), and multiple senior investigators (including O. Ghattas), *Exascale Predictive Simulation of Inductively Coupled Plasma Torches*, Department of Energy, National Nuclear Security Administration, Predictive Science Academic Alliance Program (PSAAP), 10/1/20–9/30/25, $16.5M.
2. D. Stanzione (PI), O. Ghattas and J. West (Co-PIs), *Preliminary Design Planning for the Leadership-Class Computing Facility*, National Science Foundation, Office of Advanced Cyberinfrastructure, Leadership Class Computing System, award 2033468, 09/30/20–12/30/21, $3,500,000.
3. P. Chen (PI) and O. Ghattas (Co-PI), *Scalable Computational Methods for Large-Scale Stochastic Optimization under High-Dimensional Uncertainty*, National Science Foundation, Division of Mathematical Sciences, Computational Mathematics program, award 2012453, 09/01/20–08/31/23, $310,000.

4. K. Willcox (PI) and O. Ghattas (Co-PI), *RISE of the Machines: Robust, Interpretable, Scalable, Efficient Decision Support*, Department of Energy, Office of Science, Advanced Scientific Computing Research (ASCR) Program, 9/1/20–8/31/23, $1,198,794.
5. O. Ghattas (PI), K. Willcox, J. Martins (Co-PIs), *Learning Optimal Aerodynamic Designs*, Advanced Research Projects Agency-Energy (ARPA-E), U.S. Department of Energy, award DE-AR0001208, 05/08/20–05/07/22, $1,616,524.
6. D. Stanzione (PI), O. Ghattas, T. Minyard, D.K. Panda, J. West (Co-PIs), *Operations & Maintenance for the Endless Frontier*, National Science Foundation, Office of Advanced Cyberinfrastructure, Leadership Class Computing System, award 1854828, 10/01/19–09/30/24, $60,000,000.
7. D. Stanzione (PI), O. Ghattas, T. Minyard, D.K. Panda, J. West (Co-PIs), *Planning for the Leadership-Class Computing Facility*, National Science Foundation, Office of Advanced Cyberinfrastructure, Leadership Class Computing System, award 1925096, 07/01/19–09/30/20, $2,000,000.
8. D. Stanzione (PI), O. Ghattas, T. Minyard, D.K. Panda, J. West (Co-PIs), *Computation for the Endless Frontier*, National Science Foundation, Office of Advanced Cyberinfrastructure, Leadership Class Computing System, award 1818253, 09/01/18–02/29/24, $66,999,135.
9. O. Ghattas and K. Willcox (Center Directors and Lead PIs), F. Alexander, G. Biros, E. Dougherty, M. Gunzburger, Y. Marzouk, R. Moser, J.T. Oden, J. Turner, and C. Webster (PIs), *AEOLUS: Advances in Experimental Design, Optimal Control, and Learning for Uncertain Complex Systems*, Department of Energy, Office of Advanced Scientific Computing Research, Mathematical Multifaceted Integrated Capability Centers (MMICCs) program, award number DE-SC0019303, 9/15/18–9/14/22, $10,000,000 (UT portion $5,598,946)
10. O. Ghattas (UT PI), *Finding Optimum Magnetic Fields with Hidden Symmetries*, Simons Foundation, Mathematics and Physical Sciences Program, 9/1/18–8/31/22, $297,414. (A collaboration with Princeton, NYU, Cornell, Columbia, Wisconsin, Australian National University, Max Planck Institute for Plasma Physics, Maryland, Warwick, Colorado–Boulder with total funding of $8M.)
11. O. Ghattas and T. Bui-Thanh, *Large-Scale Joint Seismic-Electromagnetic Inversion with Quantified Uncertainties*, King Abdullah University of Science and Technology (KAUST) Office of Sponsored Research (OSR), Award 04/01/2018–06/30/19, $238,140.
12. O. Ghattas, Y. Marzouk, M. Parno, N. Petra, and G. Stadler, *Gene Golub SIAM Summer School: Inverse Problems: Systematic Integration of Data with Models under Uncertainty*, Society for Industrial and Applied Mathematics, $109,200. (Funding provided by SIAM to hold a 2-week summer school on inverse problems in Breckenridge, CO, June 16–30, 2018. http://g2s3.com/
13. O. Ghattas (PI), G. Biros, T. Bui-Thanh, and C. Dawson (Co-PIs), *Large-scale Inverse Problems and Uncertainty Quantification for Reservoir Modeling*, ExxonMobil Upstream Research, 7/1/17–5/31/20, $1,020,106.
14. O. Ghattas (PI); G. Biros and Y. Marzouk (Co-PIs), *Bayesian Optimal Experimental Design for Inverse Scattering*, Air Force Office of Scientific Research, Computational Mathematics program, grant FA9550-17-1-0190, 03/15/2017–3/14/2020, $1,063,665.
15. O. Ghattas (PI) and U. Villa (Co-PI), *Collaborative Research: SI2-SSI: Integrating Data with Complex Predictive Models under Uncertainty: An Extensible Software Framework for Large-Scale Bayesian Inversion*, National Science Foundation, Division of Advanced Cyberinfrastructure, Grant ACI-1550593, 09/01/16–08/31/20, $350,885. (A collaborative research project with N. Petra (UC-Merced) and Y. Marzouk and M. Parno (MIT) with total funding of $1.35M.)

16. D. Stanzione (PI); N. Gaffney, K. Gaither, W. Barth, and T. Minyard (Co-PIs); O. Ghattas et al. (Senior Investigators), *Stampede 2: The Next Generation of Petascale Computing for Science and Engineering*, National Science Foundation, Division of Advanced Cyberinfrastructure, Grant ACI-1540931, 06/01/2016–5/31/2020, $30,000,000.

17. O. Ghattas (PI) and T. Bui-Thanh (Co-PI), *Large-Scale Joint Seismic-Electromagnetic Inversion with Quantified Uncertainties*, King Abdullah University of Science and Technology (KAUST) Office of Sponsored Research (OSR), Award OSR-2016-CCF-2596, 04/01/2016–06/30/17, $243,254.

18. O. Ghattas (PI), R. Moser, G. Biros, K. Willcox, M. Heinkenschloss, A. Stuart, M. Girolami, A. Philpott (Co-PIs), *Inference, Simulation, and Optimization of Complex Systems Under Uncertainty: Theory, Algorithms, and Applications to Turbulent Combustion*, Defense Advanced Research Projects Agency, EQUiPS program, contract W911NF-15-2-0121, 9/11/2015–8/28/2017, $2,500,000.

19. O. Ghattas (PI), M. Hesse (Co-PI), *CDS&E: Collaborative Research: A Bayesian inference framework for management of CO2 sequestration*, National Science Foundation, Division Of Chemical, Bioengineering, Environmental, & Transport Systems, grant CBET-1508713, 10/01/15–9/30/17, $139,998.00. Part of a collaborative grant with K. Willcox (MIT) and G. Stadler (NYU).

20. L. Lake (PI) et al., Center for Frontiers of Subsurface Energy Security (CFSES), Department of Energy, Energy Frontiers Research Centers program, grant DE-SC0001114, 8/1/2014–7/31/2018, $6,400,000 (UT-Austin component).

21. R. Moser (PI), O. Ghattas (Co-PI), Develop and implement practical methods for uncertainty quantification for DOD science-based software, Department of Defense, CREATE program, 14463-PETTT-UTAUSTIN-T08, 3/5/2014–2/29/2016, $726,370.

22. G. Biros (PI), T. Bui-Thanh, O. Ghattas, Y. Marzouk (MIT), R.M. Moser, and J.T. Oden (Co-PIs), Extreme-scale Bayesian inference for uncertainty quantification of complex simulations, Department of Energy, Office of Science, Advanced Scientific Computing Research program, grant DE-SC0010518, 9/1/2013–8/31/2017, $2,442,858.

23. O. Ghattas and K. Willcox (lead PIs); D. Estep, C. Gable, M. Gunzburger, B. Sumpter, L. Ying (institutional PIs); G. Biros, C. Dawson, R. Juanes, Y. Marzouk, R. Moser, J.T. Oden, Co-PIs; *DiaMonD: An Integrated Multifaceted Approach to Mathematics at the Interfaces of Data, Models, and Decisions*, Department of Energy, Office of Science, Advanced Scientific Computing Research, Mathematical Multifaceted Integrated Capability Centers (MMICCs) program, grant no. DE-FC02-13ER26128/DE-SC0009286, 12/15/2012–2/14/2019, $12,500,000 total (UT-Austin portion is $5,425,000).

24. O. Ghattas (PI), G. Biros, T. Bui-Thanh, L. Demkowicz, J. Gopalakrishnan, J.T. Oden, and G. Stadler (Co-PIs), *Ultra-scalable algorithms for large-scale uncertainty quantification in inverse wave propagation*, Air Force Office of Scientific Research, Computational Mathematics program, grant FA9550-12-1-0484, 9/30/2012–11/30/2015, $1,825,000.

25. J. Beaman (PI), J. Murthy, O. Ghattas, R. Moser, A. Mok (Co-PIs), *CPS: Synergy: Cyber Enabled Manufacturing Systems (CeMs) for Small Lot Manufacture*, National Science Foundation, Division of Computer and Network Systems, Cyber-Physical Systems program, CNS-1239343, 10/1/2012–9/30/2017, $1,000,000.

26. C. Jackson (UT-Austin PI), G. Stadler, and O. Ghattas, *Predicting Ice Sheet and Climate Evolution at Extreme Scales (PISCEES)*, DOE Office of Science, Office of Biological and Envi-

ronmental Research, SciDAC program, grant DE-11018096, 6/15/2012–6/14/2017, $549,999. Part of a larger multi-institutional grant led by W. Lipscomb and P. Jones, LANL.

27. R. Moser (UT-Austin PI), O. Ghattas (UT-Austin Co-PI), *Center for Exascale Simulation of Combustion in Turbulence (ExaCT)*, DOE Office of Science, SciDAC Exascale Co-Design Program, 10/1/2011–8/31/2016, $1,322,500. Part of a larger multi-institution grant led by J. Chen, Sandia.
28. O. Ghattas (UT-Austin PI), R. Moser (UT-Austin Co-PI), E. Prudencio (UT-Austin Co-PI), *QUEST: Quantification of Uncertainty in Extreme Scale Computations*, DOE Office of Science, SciDAC Institutes Program, grant DE-FC02-11ER26052/DE-SC0006656, 9/1/11–8/31/16, $750,000. (Part of a $7.5M multi-institutional grant led by H. Najm (Sandia) and including B. Debusschere (SNL), M. Eldred (SNL), J. Gattiker (LANL), R. Ghanem (USC), D. Higdon (LANL), O. Knio (JHU), Y. Marzouk (MIT)).
29. J. Boisseau (PI), D. Stanzione, T. Minyard, K. Schulz, W. Barth (Co-PIs), O. Ghattas et al. (senior personnel), *Enabling, Enhancing, and Extending Petascale Computing for Science and Engineering*, NSF Office of Cyberinfrastructure, OCI-1134872, 09/01/11-9/30/17, $56,000,000.
30. K. Willcox (principal investigator), G Biros, O. Ghattas, et al., (co-principal investigators), *Dynamic Data Driven Methods for Self-Aware Aerospace Vehicles*, Air Force Office of Scientific Research, 09/30/11–09/29/14, $1,195,458 (UT subcontract: $305,019).
31. O. Ghattas, principal investigator, S. Grand, C. Burstedde, G. Stadler, and L. Wilcox, co-principal investigators, *CDI Type II: Collaborative Research: Ultra-high resolution dynamic earth models through joint inversion of seismic and geodynamic data*, National Science Foundation, Cyber-Enabled Discovery and Innovation Program, grant CMMI-1028889, 09/01/10–8/31/15, $949,919. (Part of a collaborative project with M. Gurnis and D. Helmberger at Caltech, and G. Biros at Georgia Tech.)
32. O. Ghattas, principal investigator, D. Blankenship, C. Burstedde, C. Jackson, G. Stadler, L. Wilcox, *Uncertainty quantification for large-scale ice sheet modeling*, Department of Energy, Office of Science, Office of Advanced Scientific Computing Research, grant DE-FG02-09ER25914/DE-SC0002710, 09/01/09–08/31/14, $981,327.
33. O. Ghattas, principal investigator, D. Blankenship, G. Catania, M. Hesse, T.J.R. Hughes, C. Jackson, L. Lavier, *CDI-Type II: Dynamics of Ice Sheets: Advanced Simulation Models, Large-Scale Data Inversion, and Quantification of Uncertainty in Sea Level Rise Projections*, National Science Foundation, Cyber-Enabled Discovery and Innovation Program, grant ARC-0941678, 09/01/09–08/31/13, $2,002,463.
34. O. Ghattas, principal investigator, Leszek Demkowicz, J. Tinsley Oden, and Lucas Wilcox, co-principal investigators, *Uncertainty Quantification for Large-Scale Inverse Scattering*, Air Force Office of Scientific Research, Computational Mathematics Program, grant FA9550-09-1-0608, 08/01/09–07/31/12, $900,000.
35. O. Ghattas, principal investigator and C. Dawson, co-principal investigator, *Large-Scale Optimization for Bayesian Inference in Complex Systems*, Department of Energy, Office of Science, Office of Advanced Scientific Computing Research, Multiscale Mathematics and Optimization for Complex Systems Program, DE-FG02-08ER25860, 8/15/08–8/14/12, $450,928.
36. R. Moser, principal investigator, and O. Ghattas and J.T. Oden, co-principal investigators, *Center for Predictive Engineering and Computational Sciences (PECOS)*, Department of Energy, National Nuclear Security Administration, Predictive Simulation Academic Alliance Program (PSAAP), Cooperative Agreement DE-FC52-08NA28615, 4/15/08–4/14/14, $17,000,000.

37. O. Ghattas, principal investigator, *KAUST-UT Austin Academic Excellence Alliance*, King Abdullah University of Science and Technology, 1/1/08–8/31/15, $26,983,756.

38. O. Ghattas, principal investigator, and G. Biros, co-principal investigator, *PetaApps: Understanding the Dynamics of the Earth: High-Resolution Mantle Convection Simulation on Petascale Computers*, National Science Foundation, Petascale Applications Program, grant OCI-0749334, 10/1/07–9/30/11, $510,939. (Part of a $900,000 collaborative project with M. Gurnis, Caltech, and S. Zhong, CU-Boulder.)

39. O. Ghattas, principal investigator, *CMG Collaborative Research: Model Integration and Joint Inversion for Large-Scale Multi-Modal Geophysical Data*, National Science Foundation, grant DMS-0724746, 9/1/07–8/31/10, $173,076. (Part of a collaborative project with E. Haber, Emory University, and L. Tenorio, Colorado School of Mines.)

40. O. Ghattas, principal investigator, *Workshop on large-scale inverse problems and quantification of uncertainty*, Air Force Office of Scientific Research, grant FA9550-07-1-0571, 08/01/07–11/30/07, $8,000.

41. O. Ghattas, principal investigator, *Workshop on large-scale inverse problems and quantification of uncertainty*, National Science Foundation, 07/01/07–06/30/08, $10,000.

42. O. Ghattas, principal investigator; *A PDE-Constrained Optimization Approach to Uncertainty Quantification in Inverse Problems, with Applications to Inverse Scattering*, Air Force Office of Scientific Research, grant FA9550-07-1-0480, 06/01/07–11/30/09, $225,000.

43. J. Boisseau, principal investigator; O. Ghattas, K. Schulz, and T. Minyard, co-principal investigators, *World-Class Science Through World Leadership in HPC*, National Science Foundation, cooperative support agreement OCI-0622780, 10/1/06–9/30/13, $64,733,304

44. J. Bielak, principal investigator; J. Steidl, L. Kallivokas, L. Velazquez, and D. Asimaki, co-principal investigators; O. Ghattas, K. Stokoe, M. Argaez, senior investigators, *NEESR-SG: High-fidelity site characterization by experimentation, field observation, and inversion-based modeling*, National Science Foundation, grant CMS-0619078, 10/1/06–9/30/12, total $1,480,000, UT-Austin portion $508,393.

45. O. Ghattas, principal investigator, *Towards Optimal Petascale Simulations (TOPS)*, Department of Energy, Mathematical Information, and Computational Sciences (MICS) division, Scientific Discovery through Advanced Computation (SciDAC-2) program, cooperative agreement no. DE-FC02-06ER25782, 9/15/06–9/14/11, $400,000. (Part of a five-year, $15.5M SciDAC-2 center led by D. Keyes and involving Argonne National Laboratory, Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratories, University of California at Berkeley, University of Colorado at Boulder, Columbia University, and University of California at San Diego.)

46. O. Ghattas, principal investigator; M. Wheeler, C. Bajaj, J.T. Oden, and J. Boisseau, co-principal investigators, *MRI: Acquisition of a High Performance Computing System for Online Simulation*, National Science Foundation, grant CNS-0619838, 9/1/06–8/31/09, total $800,000.

47. M. Tomasso, principal investigator; S. Fomel and O. Ghattas, co- principal investigators, *Multi-component seismic data analysis with application to characterizing subsurface lithological variability*, Apache Corporation, 3/1/06–4/1/07, $221,444 (including $71,474 Jackson School of Geosciences match).

48. O. Ghattas, lead principal investigator; G. Biros (Penn) and K. Willcox (MIT), principal investigators, *Collaborative Research: DDDAS-TMRP: MIPS: A Real-Time Measurement-Inversion-Prediction-Steering Framework for Hazardous Events*, National Science Foundation — Dynamic

Data Driven Application Systems (DDDAS) Program, grant CNS-0540372, 10/1/05–9/30/09, total $825,000, UT-Austin portion $275,000. (AFOSR contributing to funding.)

49. M. Sacks, principal investigator, J. Antaki, S. Badylak, H. Borovetz, O. Ghattas, P. Leduc, D. Vorp, S. Woo, co-investigators, *Training in Biomechanics in Regenerative Medicine*, National Institute for Biomedical Imaging and Bioengineering (NIH/NIBIB), National Research Service Award Institutional Research Training Grants (T32), 5/04, $1.4M.

50. O. Ghattas, lead principal investigator; G. Biros (Penn), E. Haber (Emory), D. Keyes (Columbia), and J. Schopf (Argonne/Chicago), principal investigators; V. Akcelik, C. Davatzikos (Penn), W. Gropp (Argonne/Chicago), and J. Modersitzki (Lubek), co-principal investigators; *ITR: Collaborative Research - ASE - (sim+dmc): Image-based Biophysical Modeling: Scalable Registration and Inversion Algorithms and Distributed Computing*; National Science Foundation—Information Technology Research (ITR) program, grant CCF-0427985, 9/2/04–8/31/10, total $1,125,000, CMU portion $242,042.

51. L. Biegler and O. Ghattas, principal investigators, *Time Dependent Contaminant Source Determination*, Sandia National Labs, 7/1/04-6/30/05, $100,000.

52. J. Bielak (principal investigator) and O. Ghattas (co-principal investigator), *ITR/NGS: Multiresolution High Fidelity Earthquake Modeling: Dynamic Rupture, Basin Response, Blind Deconvolution Seismic Inversion, and Ultrascale Computing*, National Science Foundation, Information Technology Research program, grant ATM-0326449, 10/1/03–8/31/08, $1,984,727. (Collaborative grant with San Diego State University and University of Texas at Austin; total is $3.0M.)

53. L. Biegler, principal investigator, and O. Ghattas, D. Keyes, and M. Heinkenschloss, co-principal investigators, *Real-time Optimization for Data Assimilation and Control of Large Scale Dynamic Simulations*, National Science Foundation, Information Technology Research program, grant ACI-0121667, 10/1/01-8/21/06, $2,500,000, CMU portion $ 1,145,000.

54. O. Ghattas, principal investigator, *Terascale Optimal PDE Simulations (TOPS) Center*, Department of Energy, Mathematical, Information, and Computational Sciences (MICS) division, Scientific Discovery Through Advanced Computation (SciDAC) program, grant DE-FC02-01-ER25477, 9/15/01–9/14/06, $644,482. (Part of a five-year, $18M center involving Argonne National Laboratory, Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, University of California-Berkeley, University of Colorado, Columbia University, New York University, University of Pennsylvania, and University of Tennessee.) (Grant transfer to UT-Austin with new grant no., DE-FG02-06ER25738.)

55. O. Ghattas, principal investigator, and L. Biegler, co-principal investigator, *Participation of Graduate Students in a Workshop on PDE-Constrained Optimization*, Santa Fe, New Mexico, April 4-6, 2001, National Science Foundation, Division of Advanced Computational Infrastructure and Research, grant ACI-0116984, 4/1/01–9/30/01, $14,628.

56. O. Ghattas, principal investigator, and G. Blelloch, G. Miller, and N. Walkington, co-principal investigators, *Simulation of Flows with Dynamic Interfaces on Multi-Teraflops Computers*, National Science Foundation—Information Technology Research (ITR) program, grant ITR-0086093, 9/1/00–8/31/04, $3,113,304.

57. D. Trotter, principal investigator, J. Bielak, B. Carter (MSU), G. Fenves (UC Berkeley), O. Ghattas, D. O'Hallaron, and B. Stojadinovic (UC Berkeley), associated investigators, *Advanced Simulation Methods for Seismic Performance of Urban Regions*, National Science Foundation grant EEC-9910786, 3/15/00–1/31/01, $383,388.

58. O. Ghattas and L. Biegler, principal investigators *Terascale Simulation-Constrained Optimization*, Computer Science Research Institute, Sandia National Laboratories, 6/28/00–12/31/04, $269,260.

59. J. Bielak, principal investigator, and O. Ghattas, D. O'Hallaron, S. Day, and J. Shewchuk, co-principal investigators, *Large-Scale Inversion-Based Modeling of Complex Earthquake Ground Motion in Sedimentary Basins*, National Science Foundation, Knowledge and Distributed Intelligence (KDI) Program, grant CMS-9980063, 9/1/99-8/31/03, $2,131,000.

60. O. Ghattas, principal investigator, and L. Biegler, co-principal investigator, *Computational Design of Artificial Organs*, Pennsylvania Infrastructure Technology Alliance grant to Carnegie Mellon University, 9/1/98–8/31/99, $51,234.

61. O. Ghattas, *Novel Scalable Algorithms for Aerospace Design Optimization on Massively Parallel Computers*, National Aeronautical and Space Administration, grant NAG-1-2090, 9/1/98–8/31/01, $276,404.

62. O. Ghattas, principal investigator, and L. Biegler, co-principal investigator, *Parallel Algorithms for Large-Scale Simulation-Based Optimization*, National Science Foundation/Sandia National Laboratories, grant ECS-9732301, 9/1/98-8/31/02, $754,230.

63. T. Mowry, principal investigator, and O. Ghattas, D. O'Hallaron, and J. Shewchuk, co-principal investigators, *Application-Specific Supercomputing*, NASA Ames Research Center, 1/1/98–12/31/01, $2,405,499.

64. T. Kanade, A. DiGioia, and O. Ghattas, *Toward a Research Agenda and Infrastructure Development in Computer Assisted Diagnosis and Therapy*; Spring 1996; Bristol, England, National Science Foundation, grant BES-9521719, 4/15/95–3/31/96, $50,000.

65. T. Kanade, principal investigator, and O. Ghattas, A. DiGioia, and B. Jaramaz, co-principal investigators, *High Performance Computing for Simulation, Planning, and Execution of Robot-Assisted Surgery*, National Science Foundation, National Challenges Program, grant ECS-9422734, 10/1/94–9/30/97, $1,799,768

66. O. Ghattas, principal investigator, *Mechanics of Interference Fit in Total Hip Replacement*, National Science Foundation, grant BES-9412503, 9/1/94–8/31/97, $148,811.

67. J. Bielak, principal investigator, and O. Ghattas, T. Gross, and D. O'Hallaron, co-principal investigators, *Earthquake Ground Motion Modeling in Large Basins*, National Science Foundation, Grand Challenges Program, grant CMS-9318163, 9/1/93–2/28/98, $2,154,000.

68. O. Ghattas and J. Bielak, principal investigators, *Computational Methodologies for Coupled Nonlinear Field Problems*, Algor, Inc., 5/1/93–4/30/98, $821,142.

69. J. Bielak and O. Ghattas, principal investigators, *A Computational Mechanics Research Laboratory*, National Science Foundation, grant CMS-9212819, 9/15/92–2/28/94, $72,000.

70. O. Ghattas, principal investigator, and G.M. Turkiyyah, co-principal investigator, *A Combined Geometric Reasoning/Numerical Optimization Methodology for Three-Dimensional Shape Synthesis*, National Science Foundation, grant DMI-9114678, 9/1/91–8/31/93, $124,171.

71. J. Bielak, principal investigator, and O. Ghattas and G.M. Turkiyyah, co-principal investigators, *Modeling Earthquake-Induced Ground Motions in Sedimentary Basins Using Massively-Parallel Computers*, National Science Foundation Grant CMS-9110439, 4/1/91–9/30/92, $34,895.

72. O. Ghattas, principal investigator, *Research Initiation: Structural Design Optimization as a Linear Programming Problem*, National Science Foundation, grant DMI-9009597, 6/1/90–5/31/92, $80,000.

73. O. Ghattas, *Methodologies for Large-Scale Shape Optimization, Engineering Design Research Center*, a National Science Foundation Engineering Research Center, grant EEC-8943164, 5/1/90–4/30/97, $316,119.

5 Professional Activities

A. Keynote and Plenary Lectures at National/International Conferences

1. Parsimonious structure-exploiting deep neural network surrogates for Bayesian inverse problems, *US National Congress on Computational Mechanics (USNCCM) 2021*, Chicago, July 2021.
2. Parsimonious structure-exploiting deep neural network surrogates for Bayesian inverse problems and optimal experimental design, *Opening Conference, NSF Institute for Mathematics and Statistics*, University of Chicago, October 7–9, 2020.
3. *Peruvian Conference on Scientific Computing*, Cusco, Peru, March 30–April 2, 2020. **(Postponed)**
4. Large-scale stochastic PDE-constrained optimization, *International Congress on Industrial and Applied Mathematics (ICIAM 2019)*, Valencia, Spain, July 15–19, 2019.
5. Large-scale stochastic PDE-constrained optimization, *XVIth Conference on the Mathematics of Finite Elements and Applications (MAFELAP 2019)*, London, United Kingdom, June 17–21, 2019.
6. Large-scale Bayesian Inversion for Geosciences Problems, *SIAM Conference on Mathematical and Computational Issues in the Geosciences*, SIAM Geosciences Career Prize Lecture, Houston, Texas, March 12, 2019.
7. Physics-Based Learning of Complex Models from Large-Scale Data: A Scalable Bayesian Inversion Approach, *International Conference on Big Data in the Geosciences*, China University of Geosciences, Wuhan, China, January 5–7, 2019.
8. Scalable Algorithms for PDE-Constrained Optimization Under Uncertainty, *6th European Conference on Computational Mechanics (Solids, Structures and Coupled Problems) (ECCM 6) and 7th European Conference on Computational Fluid Dynamics (ECFD 7)*, Glasgow, UK, June 11–15, 2018.
9. Scalable Algorithms for PDE-Constrained Optimization Under Uncertainty, *2018 SIAM Conference on Uncertainty Quantification*, Anaheim, CA, April 16–19, 2018.
10. Optimization under uncertainty for complex PDE models in high dimensions, *2nd International Conference on Simulation Technology (SimTech 2018)*, University of Stuttgart, Germany, March 26–28, 2018.
11. Scalable Bayesian Seismic Inversion, *3rd European Association of Geoscientists and Engineers (EAGE) High Performance Computing in Upstream*, Athens, Greece, October 1–4, 2017.
12. Large-scale Bayesian inversion for flow of the Antarctic ice sheet, *Texas Applied Mathematics and Engineering Symposium*, The University of Texas at Austin, Austin, TX, September 21–23, 2017.
13. Scalable Algorithms for Bayesian Inference of Large-Scale Models from Large-Scale Data, *VECPAR 2016*, Porto, Portugal, June 28–30, 2016.
14. Extreme-scale Bayesian inverse problems for non-Newtonian geophysical flows, *PRACE 2016*, Prague, Czech Republic, May 12, 2016.

15. Uncertainty Quantification for Large-Scale Models: From Data to Inference to Optimization, *Joint Conference of the German Mathematical Society (DMV) and the International Association of Applied Mathematics and Mechanics (GAMM)*, Technical University of Braunschweig, Germany, March 7–11, 2016.
16. Large-scale Bayesian inverse problems and the flow of the Antarctic ice sheet, *24th International Meshing Roundtable*, Austin, TX, October 12–14, 2015.
17. Hessian-based Implicit Dimension Reduction for Large-scale Bayesian Inverse Problems, *International Conference on Scientific Computing and Differential Equations (SciCADE 2015)*, Potsdam, Germany, September 14–18, 2015.
18. Bayesian inversion for large scale Antarctic ice sheet flow, *52nd Meeting of the Society for Natural Philosophy*, Rio de Janeiro, Brazil, October 22–24, 2014.
19. Mathematical and computational challenges in large-scale Bayesian inverse problems arising in the flow of the Antarctic ice sheet, *Prospects in Applied Mathematics*, Chicago, IL, October 19–20, 2014.
20. Big data, sparse information: Bayesian inference for large-scale models, with application to inverse modeling of Antarctic ice sheet dynamics, *SIAM Annual Meeting*, Chicago, IL, July 7–14, 2014.
21. Big data, sparse information: Bayesian inference for large-scale models, with application to inverse modeling of Antarctic ice sheet dynamics, *PASC14 Conference*, Zurich, Switzerland, June 2–3, 2014.
22. Big data, sparse information: Bayesian inference for large-scale models, with application to inverse modeling of Antarctic ice sheet dynamics, *International Conference on Scientific Computing at Extreme Scale*, Shanghai Jiao Tong University, Shanghai, China, May 7–9, 2014.
23. Integrating Big Data and Big Models via Bayesian Inference, *TAMEST Annual Meeting*, Austin, TX, January 16–17, 2014.
24. Stochastic Newton MCMC Methods for Bayesian Inverse Problems, with Application to Ice Sheet Dynamics, *European Conference on Numerical Mathematics and Advanced Applications (ENUMATH) 2013*, Lausanne, Switzerland, August 26–30, 2013.
25. The stochastic Newton method: Combining large-scale optimization and Markov chain Monte Carlo methods for the solution of PDE-constrained Bayesian inverse problems, *MOPTA 2013*, Bethlehem, PA, August 14–16, 2013.
26. DiaMonD: An Integrated Multifaceted Approach to Mathematics at the Interfaces of Data, Models, and Decisions, *DOE Applied Mathematics Program Meeting*, Albuquerque, NM, August 2013. (with K. Willcox)
27. Solution of large-scale Bayesian inverse problems governed by seismic wave propagation, *US National Congress on Computational Mechanics (USNCCM) 2013*, Raleigh, NC, July 22–25, 2013.
28. Uncertainty quantification for large scale inverse problems, with applications to seismic inverse problems, *Uncertainty in Computer Models 2012*, Sheffield, UK, July 2–4, 2012.
29. Toward uncertainty quantification in large-scale Bayesian inverse problems, with geophysical applications, *8th Erlangen International High-End-Computing Symposium*, Erlangen, Germany, June 22, 2012.
30. Uncertainty quantification in geophysical inverse problems: Opportunities and challenges, *Winter Enrichment Program*, KAUST, January 14, 2012.

31. Grand challenges in computational inverse problems, with illustrations from geophysics, *Challenges in Computing*, Oslo, Norway, December 14–15, 2011.
32. A stochastic Newton method for large-scale seismic wave propagation inverse problems, *10th International Conference on Mathematical and Numerical Aspects of Waves Propagation (WAVES 2011)*, Vancouver, Canada, July 25–29, 2011.
33. Petascale AMR, with applications to solid earth geophysics problems, *Swiss Workshop on High Performance Computing*, Zurich, Switzerland, September 6–7, 2010.
34. Parallel adaptive mesh methods on petascale computers, with applications to geophysical problems *2009 Iberian-Latin American Conference on Computational Methods in Engineering*, Armacao de Buzios, Brazil, November 8–11, 2009.
35. Adaptive mantle convection simulation on petascale supercomputers, *10th LCI International Conference on High-Performance Clustered Computing*, Boulder, CO, March 10–12, 2009
36. Parallel mantle convection simulation on dynamically adapted octree meshes, *2008 International Parallel Computational Fluid Dynamics Conference*, Lyon, France, May 19–22, 2008.
37. Parallel scalable algorithms for dynamic mesh adaptivity, state and parameter estimation, and uncertainty quantification for large-scale simulations, *World Modeling Summit for Climate Prediction*, Reading, United Kingdom, May 6–9, 2008.
38. Opportunities and Challenges in Computational Science, *KAUST (King Abdullah University of Science and Technology) IT Summit*, Dhahran, Saudi Arabia, October 29, 2007.
39. Scaling of Seismic Inversion to Petaflops Systems, *Applied Inverse Problems 2007*, Vancouver, Canada, June 25–29, 2007.
40. Prospects for Full Waveform Earthquake Inversion on Petaflops Computers, *HPCS 2007*, Saskatoon, Saskatchewan, Canada, May 13-16, 2007.
41. Full waveform elastodynamic-based earthquake inversion on terascale supercomputers, *SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Santa Fe, NM, March 19-22, 2007.
42. Peering into the earth: Full waveform elastodynamic-based earthquake inversion on terascale supercomputers, *VECPAR 2006: The 7th International Meeting on High Performance Computing for Computational Science*, Rio de Janeiro, Brazil, July 10-12, 2006.
43. Optimization of Systems Governed by PDEs: Parallel Algorithms and Applications in Inverse Earthquake Modeling, *US National Congress on Computational Mechanics*, Austin, TX, July 24–28, 2005.
44. Optimization of Systems Governed by PDEs: Algorithms and Applications in Computational Science and Engineering *DOE Scientific Discovery through Advanced Computing (SciDAC) 2005 Conference*, San Francisco, CA, June 26–30, 2005.
45. Large-scale Earthquake Inversion, *SIAM Conference on Optimization*, Stockholm, Sweden, May 15–19, 2005.
46. Multiscale methods for inverse wave propagation, *15th International Conference on Domain Decomposition Methods*, Berlin, Germany, July 24, 2003.
47. Multiscale methods for seismic inversion, *ASCE 16th Engineering Mechanics Conference*, Seattle, Washington, July 18, 2003.
48. Inverse earthquake modeling on terascale computers, *Scientific Computing and Differential Equations (SciCADE 2003)*, Trondheim, Norway, June 30, 2003.

B. Invited Workshop and Conference Talks

49. TBA, *BIRS Workshop on Big Data and Inverse Problems*, Banff, Alberta, Canada, April 19–23, 2021.
50. Scalable Structure-Exploiting Approaches to Optimal Experimental Design, *SIAM Conference on Computational Science & Engineering*, Fort Worth, TX, March 1–5, 2021.
51. TBA, *BIRS Workshop on Optimization Under Uncertainty*, Banff, Alberta, Canada, February 8–12, 2021.
52. Fast methods for Bayesian inverse problems governed by stochastic PDEs, *World Congress on Computational Mechanics (WCCM-ECCOMAS 2020)*, rescheduled for virtual event, January 11–15, 2021.
53. TBA, *Workshop on Inverse Problems at Large Scales*, Special Semester on Tomography Across the Scales, Radon Institute of the Austrian Academy of Sciences, Linz, Austria, December 14–18, 2020.
54. TBA, *Oberwolfach Workshop on Inverse Problems*, Oberwolfach, Germany, December 7–11, 2020.
55. Parsimonious structure-exploiting deep neural network surrogates for Bayesian inverse problems, *Robert J. Melosh Medal Competition for Best Student Paper in Finite Elements*, Duke University, Durham, NC, October 22–23, 2020. (Online)
56. TBA, *2020 Rising Stars Workshop*, online, October 13, 2020.
57. Parsimonious structure-exploiting deep neural network surrogates for Bayesian inverse problems, *Society for Engineering Science, 2020 Virtual Technical Meeting*, September 29–October 1, 2020.
58. Fast methods for Bayesian inverse problems governed by stochastic PDEs, *World Congress on Computational Mechanics*, Paris, France, July 19–24, 2020. (Cancelled)
59. *Computational Uncertainty Quantification: Mathematical Foundations, Methodology, and Data*, Erwin Schrödinger International Institute for Mathematics and Physics, Vienna, Austria, May 11–15, 2020. (Cancelled)
60. Optimal neural networks for learning high-dimensional input-output maps defined by PDEs, *SIAM Conference on Mathematics of Data Science*, May 5–8, 2020. (Cancelled)
61. *Oberwolfach Workshop on Data Assimilation*, Oberwolfach, Germany, April 12–18, 2020. (Cancelled)
62. *SIAM Conference on Uncertainty Quantification*, Munich, Germany, March 24–27, 2020. (Cancelled)
63. Machine Learning for Inferring Scientific Models: Hope or Hype? *NSF Workshop on Artificial Intelligence in Natural Hazards Engineering*, Austin, TX, February 18–19, 2020.
64. Scalable Methods for Bayesian Optimal Experimental Design, *International Workshop on Data-Centric Engineering*, Cambridge, MA, December 9–12, 2019.
65. Fast methods for Bayesian inverse problems governed by random PDE forward models, *Workshop on Optimization and Inversion under Uncertainty*, Radon Institute for Computational and Applied Mathematics (RICAM) of the Austrian Academy of Sciences, Linz, Austria, November 11–15, 2019.

66. Scalable Optimal Experimental Design for Bayesian Inverse Problems, *Workshop on Big Data, Data Assimilation, and Uncertainty Quantification*, Institut Henri Poincaré, Paris, France, November 12–15, 2019.
67. Optimal Experimental Design for Large-Scale Bayesian Inverse Problems via Multi-PDE-Constrained Optimization, *Workshop on New Trends in PDE-Constrained Optimization*, Radon Institute for Computational and Applied Mathematics (RICAM) of the Austrian Academy of Sciences, Linz, Austria, October 14–18, 2019.
68. Fast methods for Bayesian inverse problems governed by PDE forward models with random coefficient fields, *Applied Inverse Problems*, Grenoble, France, July 8–12, 2019.
69. Some Thoughts on the Role of Machine Learning in Climate Modeling, *Workshop on Machine Learning and the Earth Climate System*, Austin, Texas, June 13, 2019.
70. Large-scale Optimal Experimental Design for Bayesian Inverse Problems *5th International Conference on Design of Experiments (ICODOE 2019)*, Memphis, TN, May 18–21, 2019.
71. Large-scale Optimal Experimental Design for Bayesian Nonlinear Inverse Problems, *SIAM Conference on Computational Science and Engineering*, Spokane, WA, Feb 25–March 1, 2019.
72. Learning from data through the lens of models: Scalable algorithms for Bayesian inverse problems, *HPC and Data Science for Scientific Discovery*, Institute for Pure and Applied Mathematics (IPAM), UCLA, Los Angeles, CA, October 15–19, 2018.
73. Scalable algorithms for optimal training data for Bayesian inference of large scale models, *Big Data Meets Large-Scale Computing*, Institute for Pure and Applied Mathematics (IPAM), UCLA, Los Angeles, CA, September 24-28, 2018.
74. Optimization Under Uncertainty for Complex PDE Models in High Dimensions, *13th World Congress on Computational Mechanics (WCCM 2018)*, New York City, NY, July 22-27, 2018.
75. Learning from data through the lens of models: Bayesian inverse problems and geoscience applications, *Big Data and Data Science for the Digital World*, 1st Fundación GADEA Scientific Symposium, Madrid, Spain, June 4–5, 2018.
76. Scalable algorithms for large-scale optimal design and control under uncertainty, *Second International, Interdisciplinary, IGSSE, ICES (I^4) Workshop*, Austin, Texas, February 19–20, 2018.
77. Toward Exascale Bayesian Seismic Inversion, *2nd ASCETE Workshop on Coupling Earthquakes and Tsunamis*, Bayrischzell, Germany, January 30–February 2, 2018.
78. Learning from data through the lens of models: Scalable algorithms for Bayesian inverse problems, *Workshop on Advanced Computing for Earth Sciences*, Porto, Portugal, December 18–20, 2017.
79. Variance reduction via Taylor approximation of high-dimensional parameter-to-output maps governed by PDEs: Applications to optimal control under uncertainty, *Trends and advances in Monte Carlo sampling algorithms*, SAMSI Workshop, Duke University, Durham, NC, December 11-15, 2017.
80. Efficient and scalable methods for large-scale stochastic PDE-constrained optimal control, *Computational Uncertainty Quantification*, Banff International Research Station, Banff, Alberta, Canada, October 8–13, 2017.
81. Optimal experimental design for large-scale PDE-constrained Bayesian inverse problems, Workshop on *Mathematical Foundations of Data Assimilation and Inverse Problems*, Foundations of Computational Mathematics conference (FoCM 2017), Barcelona, Spain, July 10–12, 2017.

82. Bayesian optimal experimental design for large-scale inverse problems, *Computational Inverse Problems, Mathematical Research Institute (MATRIX)*, University of Melbourne, Australia, June 19-23, 2017.
83. Scalable methods for optimal control of systems governed by PDEs with random coefficient fields, *Data Assimilation, Uncertainty Reduction, and Optimization for Subsurface Flow*, Institute for Pure and Applied Mathematics, UCLA, Los Angeles, CA, May 22–26, 2017.
84. Some thoughts on Bayesian inverse problems and HPC, *NSF Workshop on data assimilation algorithms, observations, and applications in the context of next-generation computing*, Arlington, VA, April 6–7, 2017.
85. Scalable methods for optimal control of PDEs with random coefficient fields, *USACM Workshop on Uncertainty Quantification and Data-Driven Modeling*, Austin, TX, March 23–24, 2017.
86. Grand Challenges in CSE, *Forward Looking Panel, 2017 SIAM Computational Science and Engineering Conference*, Atlanta, GA, February 27–March 3, 2017.
87. From Data to Optimization Under Uncertainty: A Scalable Framework for Bayesian Inversion and Optimal Control of Random PDEs with Application to Turbulent Flows, *2017 SIAM Computational Science and Engineering Conference*, Atlanta, GA, February 27–March 3, 2017.
88. Large Scale Bayesian Inverse Problems, *I^4 Workshop: ICES, IGSSE, International, and Interdisciplinary*, TU Munich, Munich, Germany, January 21–22, 2017.
89. Towards HPC + UQ in Bayesian Inverse Problems, *Dagstuhl Workshop on Uncertainty Quantification and High Performance Computing*, Dagstuhl, Germany, September 12–16, 2016.
90. Big data meets big models: Towards exascale Bayesian inverse problems, *24th International Congress of Theoretical and Applied Mechanics (ICTAM 2016)*, Montreal, Quebec, Canada, August 20–26, 2016.
91. Towards Uncertainty Quantification in Turbulence, *From Turbulence to Uncertainty Quantification*, A Symposium in Honor of Professor Robert Moser on his 60th Birthday, The University of Texas at Austin, Austin, Texas, August 16, 2016.
92. Scalable Methods Based on Taylor Approximations and Randomized Algorithms for High-Dimensional Bayesian Inverse Problems Governed by PDEs, *12th World Congress on Computational Mechanics*, Seoul, Korea, July 24–29, 2016.
93. From data to prediction with quantified uncertainties: Scalable parallel algorithms and applications to the flow of ice sheets, *SIAM Conference on Parallel Processing for Scientific Computing (PP16)*, Paris, France, April 12-15, 2016.
94. Optimal experimental design for large-scale PDE-constrained Bayesian inverse problems, *SIAM Conference on Uncertainty Quantification (UQ16)*, Lausanne, Switzerland, April 5–8, 2016.
95. Optimal control of systems governed by PDEs with random parameter fields using quadratic approximations, *Workshop on Computational Methods for Control of Infinite-dimensional Systems*, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN, March 14–18, 2016.
96. Scalable algorithms for optimal experimental design for infinite dimensional nonlinear Bayesian inverse problems, *Data Assimilation and Inverse Problems*, University of Warwick, United Kingdom, February 22–24, 2016.
97. Bayesian Inversion for Large-scale Geophysical Models (with Application to the Flow of the Antarctic ice Sheet), *Workshop on Big Data in Geoscience*, Alan Turing Institute, London, UK, January 25–27, 2016.

98. Scalable Algorithms for Optimal Control of Systems Governed by PDEs Under Uncertainty, *Advances in Uncertainty Quantification Methods, Algorithms and Applications*, KAUST, Saudi Arabia, January 5–10, 2016.
99. Bayesian inference in inverse problems governed by PDEs, with application to ice flow inverse problems, *Rocky Mountain Summer Workshop on Uncertainty Quantification*, University of Colorado Denver, July 15–17, 2015.
100. Introduction to deterministic inverse problems, *ICERM IdeaLab*, Institute for Computational and Experimental Mathematics, Brown University, Providence, RI, July 6–10, 2015.
101. Scalable parameterized surrogates based on low rank tensor approximations for large-scale Bayesian seismic inverse problems, *SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Stanford, California, June 29–July 2, 2015.
102. Optimal Experimental Design for Large-Scale Bayesian Nonlinear Inverse Problems, *Applied Inverse Problems 2015*, Helsinki, Finland, May 25–29, 2015.
103. Hessian-based Implicit Dimension Reduction for Large-scale Bayesian Inverse Problems, *Big Data and Predictive Computational Modeling*, Technical University of Munich, Munich, Germany, May 18-21, 2015.
104. From data to prediction via reduced parameter-to-observable maps: Applications to Antarctic ice sheet dynamics, *SIAM Conference on Computational Science and Engineering*, Salt Lake City, UT, March 14-18, 2015.
105. Bayesian Inversion for Large Scale Antarctic Ice Sheet Flow, *American Geophysical Union Fall Meeting*, San Francisco, CA, December 15–19, 2014.
106. Bayesian Inversion for Large Scale Antarctic Ice Sheet Flow, *AmeriMech Symposium: Material Property Identification*, Austin, TX, December 10–12, 2014.
107. Perspective on Co-Design: Uncertainty Quantification Challenges at Extreme Scale, *International Workshop on Co-Design*, Guangzhou, China, November 6–10, 2014.
108. Sparse structure-exploiting methods for large-scale Bayesian inverse problems, *Workshop on Approximation, Integration, and Optimization*, Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University, September 29–October 3, 2014.
109. Big data meets big models: Large-scale Bayesian inference, with application to inverse modeling of Antarctic ice sheet dynamics, *11th World Congress on Computational Mechanics*, Barcelona, Spain, July 20–25, 2014.
110. Large-scale Bayesian inversion with application to Antarctic ice sheet flow, *Spatial Statistics and Uncertainty Quantification on Supercomputers*, University of Bath, UK, May 19–21, 2014.
111. Scalable algorithms for Bayesian inverse problems and optimal experimental design with applications to large-scale complex systems, *SIAM Conference on Uncertainty Quantification*, Savannah, GA, March 31–April 4, 2014.
112. Optimal experimental design for large-scale Bayesian inverse problems, *Advances in Uncertainty Quantification Methods, Algorithms and Applications (UQAW 2014)*, KAUST, Thuwal, Saudi Arabia, January 6–10, 2014.
113. Bayesian inverse modeling of the flow of the Antarctic ice sheet, *EQUIP Annual meeting*, University of Warwick, UK, December 20, 2013.
114. Large-scale Bayesian seismic inversion, *High Performance Computing and its Applications*, WesternGeco Richmond, Houston, Texas, September 30–October 2, 2013.

115. Large-scale Bayesian inverse wave propagation, *2013 International Symposium on Nonlinear Theory and its Applications (NOLTA2013)*, Santa Fe, NM, September 8–12, 2013.

116. Big Data Meets Big Models: Towards Solution of Large-Scale Bayesian Inverse Problems, *CyberBridges: Developing the Next Generation of Cyberinfrastructure for Computational and Data-Enabled Science and Engineering*, National Science Foundation, Arlington, VA, July 15–16, 2013.

117. Large-scale Bayesian seismic inversion, *SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Padua, Italy, June 17–20, 2013.

118. Quantification of uncertainty for large-scale seismic inverse problems, *Numerical Methods for Uncertainty Quantification*, Hausdorff Center for Mathematics, University of Bonn, Germany, May 13–17, 2013.

119. Large-Scale Solution of Bayesian Inverse Problems Governed by Wave Propagation, *Workshop on Multiscale Waveform Modeling, Simulation, and Inversion*, KAUST, Saudi Arabia, May 4–7, 2013.

120. Extreme-scale UQ for inverse problems, with applications to global seismic inversion, *SIAM Conference on Computational Science and Engineering*, Boston, MA, February 25–March 1, 2013.

121. Extreme-scale UQ for inverse problems, TACC Booth, *SC12*, Salt Lake City, UT, November 14, 2012.

122. Large scale Bayesian solution of seismic inverse problems, Oberwolfach meeting on computational inverse problems, *Oberwolfach Institute*, Germany, October 22–26, 2012.

123. Extreme-scale UQ for inverse problems, with applications to global seismic inversion, *Uncertainty Quantification for High-Performance Computing*, Oak Ridge National Laboratory, Oak Ridge, TN, May 2–4, 2012.

124. Toward extreme scale stochastic inversion, *SIAM Conference on Uncertainty Quantification*, Raleigh, NC, April 1–4, 2012.

125. Research directions in verification, validation, & uncertainty Quantification, *National Academies Symposium on Verification, Validation, and Uncertainty Quantification*, National Research Council, Washington, DC, March 28, 2012.

126. Uncertainty quantification in full waveform seismic inversion, *Texas Consortium for Computational Seismology 2012 Spring Research Meeting*, Houston, TX, March 23, 2012.

127. Large-scale parallel Hessian-based methods for uncertainty quantification in inverse problems, *SIAM Conference on Parallel Processing for Science and Engineering*, Savannah, GA, February 15–17, 2012.

128. Uncertainty quantification for large-scale inverse problems: Challenges and opportunities, *First Annual CESM Uncertainty Quantification and Analysis Interest Group Meeting*, NCAR, Boulder, CO, January 30, 2012.

129. Large Scale Uncertainty Quantification for Stochastic Inverse Problems with Applications to Seismic Inversion, *Colloquium on Advances in Computational Science, Engineering and Mathematics*, Austin, Texas, January 19-21, 2012.

130. Hessian-based reduction for large-scale statistical inverse wave propagation, *Workshop on Fast Solvers for Simulation, Inversion, and Control of Wave Propagation Problems*, Würzburg, Germany, September 26–28, 2011.

131. A stochastic Newton method for large-scale statistical inverse problems with application to geophysical inverse problems, *SAMSI Program on Uncertainty Quantification: Geosciences*, Research Triangle Park, NC, September 21–23, 2011.

132. Large-scale seismic inversion: elastic-acoustic coupling, DG discretization, gradient consistency, adaptivity, uncertainty quantification, and parallel algorithms, *ICIAM 2011*, Vancouver, Canada, July 18–22, 2011.

133. Uncertainty quantification for large-scale full-Stokes ice sheet modeling and simulation, *ICIAM 2011*, Vancouver, Canada, July 18–22, 2011.

134. Scalable algorithms for large-scale statistical inverse problems, with application to global seismic inversion, *Aachen Conference on Computational Engineering Science*, Aachen, Germany, July 13-15, 2011.

135. Top Five Grand Challenges in Computational Science, *TACC 10th Anniversary Celebration*, Austin, TX, June 24, 2011.

136. The role of TACC in enabling research on multiscale geophysical problems, *TACC 10th Anniversary Celebration*, Austin, TX, June 24, 2011.

137. A stochastic Newton method for large-scale statistical inverse problems, with application to seismic inversion, *Inverse Problems and Optimal Control for PDEs*, Warwick, UK, May 23–27, 2011.

138. Large-scale seismic inversion: elastic-acoustic coupling, DG discretization, gradient consistency, adaptivity, uncertainty quantification, and parallel algorithms, *Workshop on Multiscale Modeling, Advanced Discretization Techniques, and Simulation of Wave Propagation*, KAUST, Saudi Arabia, May 7-8, 2011,

139. DG-based, UQ-equipped, parallel, adaptive, scalable elastic-acoustic seismic inversion, *SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Long Beach, CA, March 21-24, 2011.

140. O. Ghattas, Grand Challenges for Next Generation End-to-End Earthquake Simulations: Uncertainty Quantification and Exascale Computing *National Research Council Workshop on Grand Challenges in Earthquake Engineering Research*, The Beckman Center of the National Academies, March 14–15, 2011.

141. A Stochastic Newton Method for Large-scale Statistical Inverse Problems with Application to Geophysical Inverse Problems, *SIAM Conference on Computational Science and Engineering*, Reno, NV, February 28–March 4, 2011.

142. Acceleration of MCMC for high dimensional statistical inverse problems via reduction of parameter-to-observable maps, *Reduction Strategies for the Simulation of Complex Problems*, Milan, Italy, January 19-21, 2011.

143. Uncertainty quantification with advanced ice sheet models, *Land Ice Working Group meeting*, National Center for Atmospheric Research, Boulder, CO, January 12–13, 2011.

144. A stochastic Newton method for statistical inverse problems governed by PDEs, *Joint IMS-ISBA Meeting (MCMSki3)*, Park City, Utah, January 5-7, 2011.

145. A stochastic Newton method for large-scale statistical inverse problems, *1st Joint North American Meeting on Industrial and Applied Mathematics*, Huatulco, Mexico, December 7-10, 2010.

146. Uncertainty quantification and dynamic data-driven application systems, *Panel on Infosymbiotic Systems*, SC10, New Orleans, November 16, 2010.

147. Extreme scale AMR, *TACC Booth, SC10*, New Orleans, November 16, 2010.
148. A stochastic Newton method for large-scale statistical inverse problems, *INFORMS Annual Meeting*, Austin, Texas, November 7-10, 2010.
149. Towards exascale computing for uncertainty quantification in geophysical inverse problems, *NSF Workshop on Application Drivers for Exascale Computing and Data Cyberinfrastructure*, Arlington, Virginia, July 29, 2010.
150. Uncertainty Quantification for Large-Scale Inverse Scattering, *AFOSR Computational Mathematics Program Review*, Arlington, VA, July 28, 2010.
151. Opportunities and challenges for uncertainty quantification in large-scale models, *NSF Workshop on Land-Ice Contributions to Sea Level*, Sterling, VA, July 11, 2010.
152. Large-Scale Optimization for Bayesian Inference in Complex Systems, *DOE Applied Mathematics Program Meeting*, Berkeley, CA, May 4, 2010.
153. A stochastic Newton method for statistical inverse problems, with application to inverse scattering, *KAUST Source Inversion Workshop*, KAUST, Thuwal, Saudi Arabia, March 22-24, 2010.
154. Advanced computational methods for large-scale forward and inverse ice sheet dynamics, *Community Climate System Model Land Ice Working Group Winter Meeting*, Boulder, CO, February 17, 2010.
155. Parallel large-scale adaptive mesh PDE solution and applications to multiscale problems in solid earth geophysics, *American Geophysical Union Fall Meeting*, San Francisco, CA, December 14–18, 2009.
156. Implications for HPC from the perspective of PDE-based modeling in the evolution from simulation to simulation-based inference, prediction, and decision-making, *NSF Workshop on Community Input on the Future of High-Performance Computing*, Arlington, Virginia, December 4, 2010.
157. Parallel scalable adaptive mesh methods for solid earth geophysics problems, *TACC Booth, SC09*, Portland, OR, November 11-14, 2009.
158. A stochastic Newton method for statistical inverse problems governed by PDEs, *SIAM Annual Meeting*, Denver, CO, July 6–10, 2009.
159. Parallel Adaptive Mesh Methods on Petascale Computers, with Applications to Geophysical Problems, *2009 NSF CMMI Research and Innovation Conference*, Honolulu, Hawaii, June 22–25, 2009.
160. KAUST: The future of the research university, *King Adbullah University of Science and Technology Discovery Scholarship Award Ceremony*, La Jolla, CA, May 30, 2009.
161. Parallel AMR for petascale geophysical problems, *Multi-scale Modelling of the Atmosphere and Ocean*, Reading, UK, March 25–26, 2009.
162. An introduction to PDE-based statistical inverse problems, Uncertainty Quantification Minitutorial, *SIAM Conference on Computational Science and Engineering*, Miami, FL, March 2–6, 2009.
163. Scalable adaptive mantle convection simulation on petascale, supercomputers, *SIAM Conference on Computational Science and Engineering*, Miami, FL, March 2–6, 2009.
164. Computational Science and Engineering Forward Looking Panel, *SIAM Conference on Computational Science and Engineering*, Miami, FL, March 2–6, 2009.

165. A stochastic Newton method for large-scale Bayesian inverse problems, with application to geophysical inverse problems, *Workshop on Energy, Wind and Water: Algorithms for Simulation, Optimization and Control*, The New Zealand Institute of Mathematics and its Applications, Auckland, New Zealand, February 9–12, 2009.
166. A stochastic Newton method for large-scale Bayesian inverse problems, *Oberwolfach Workshop on Numerical Techniques for Optimization Problems with PDE Constraints*, Oberwolfach, Germany, January 25–31, 2009.
167. Parallel scalable mantle convection simulation on petascale supercomputers, *TACC booth talk, SC08*, Austin, TX, November 18, 2008.
168. Parallel adaptive mesh refinement for mantle convection simulation, *Summer School on Multiscale Modeling and Analysis*, The University of Texas at Austin, Austin, TX, August 4–8, 2008.
169. Structure-exploiting Bayesian inversion, *Stanford Uncertainty Quantification Workshop*, Stanford, CA, July 25–26, 2008.
170. Towards scalable adaptive mantle convection simulation on petascale supercomputers, *8th.World Congress on Computational Mechanics (WCCM8)/ 5th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2008)*, Venice, Italy, June 30-–July 5, 2008.
171. Uncertainty quantification in PDE-based inverse problems, *SIAM Conference on Optimization*, Boston, MA, May 10–13, 2008.
172. Toward petascale simulation in earth sciences, *German Research Foundation Round Table: Supercomputing and E-infrastructure in Earth Sciences*, Tutzing, Germany, March 31–April 1, 2008.
173. Towards Inverse Earthquake Modeling on Petascale Supercomputers, *Workshop on Inverse Problems and System Identification of Geo-Systems*, Inverse Problems Center at Rensselaer Polytechnic Institute, Troy, NY, March 24, 2008.
174. Towards Petascale Forward and Inverse Adaptive Simulations in Geodynamics, *SIAM Conference on Parallel Processing for Scientific Computing*, Atlanta, GA, March 12-14, 2008.
175. Prospects for scaling of seismic inversion to petaflops systems, *American Geophysical Union Fall meeting*, Session S20: Seismic Tomography: Pushing the Resolution Limits, San Francisco, CA, December 10–14, 2007. (Invited session)
176. Parallel adaptivity at the petascale: Challenges and opportunities, *TeraGrid PetaScale Workshop*, Tempe, AZ, December 11–12, 2007.
177. Parallel octree-based adaptive finite elements for large-scale geoscience applications, *Texas Advanced Computing Center Booth*, SC07, Reno, NV, November 13 and 14, 2007.
178. Opportunities and Challenges in Simulation and Modeling for Understanding Complexity in Natural, Built, and Social Systems, *NSF Workshop on Cyberenabled Discovery and Innovation*, Seattle, WA, November 3, 2007.
179. The perspective from PDE-constrained optimization: Fast algorithms and their potential for quantifying uncertainty in inverse problems, *Sandia/NSF/AFOSR Workshop on Uncertainty Quantification and Large-Scale Inverse Problems*, Santa Fe, NM, September 10–12, 2007.
180. Scaling of seismic inversion to petaflops systems, minisymposium on Petaflops Applications in Computational Mechanics, in honor of Prof. J.T. Oden's 70th birthday, *9th US National Congress on Computational Mechanics*, San Francisco, CA, July 23–26, 2007. (Invited symposium)

181. Panel on research directions in computational geosciences, *SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Santa Fe, NM, March 19-22, 2007. (Invited panelist)
182. Panel on CS&E Programs and Disciplinary Degree Programs, *SIAM Conference on Computational Science and Engineering*, Costa Mesa, CA, February 19-23, 2007. (Invited panelist)
183. End-to-end sensing, inversion, prediction, and control for HPC applications, *DDDAS Birds-of-a-Feather Session*, SC06, Tampa, Florida, November 14, 2006. (Invited session)
184. Multigrid preconditioners for ill-posed inverse problems, *2006 International Workshop on Collaboration between Numerical Methods and Large-Scale Scientific Computation*, University of Tokyo, Tokyo, Japan, October 25, 2006. (Invited workshop)
185. Toward forward and inverse earthquake modeling on petaflop computers, *1st International Symposium for Integrated Predictive Simulation System for Earthquake and Tsunami Disaster*, University of Tokyo, Tokyo, Japan, October 23–24, 2006. (Invited symposium)
186. Large-scale inverse transport: Multigrid methods and uncertainty quantification, *SIAM Annual Meeting*, Boston, MA, July 10–14, 2006. (Invited minisymposium)
187. Large-scale parallel octree-based forward and inverse seismic wave propagation modeling, *SEAM Consortium Meeting*, Houston, TX, April 18, 2006.
188. Opportunities and challenges for earthquake inversion at the petascale, *Petascale Computing and the Geosciences Workshop*, San Diego Supercomputing Center and University of California at San Diego, San Diego, CA, April 4–5, 2006.
189. Towards petascale earthquake inversion, *Dagstuhl Workshop on Architectures and Algorithms for Petascale Computing*, Saarbrucken, Germany, February 12–17, 2006.
190. Computational Issues in Full Waveform Inversion and Image Registration, *Apache Corporation*, Houston, TX, December 13, 2005.
191. Large scale inverse earthquake modeling on terascale supercomputers, *Pittsburgh Supercomputing Center booth talk*, SC2005, Seattle, WA, November 15, 2005.
192. Real-time identification of atmospheric contaminants, *Workshop on Control of Complex Fluids*, Research Institute for Computational and Applied Mathematics, Linz, Austria, October 10–14, 2005.
193. An optimal control approach to elastic image registration, *SIAM Conference on Control and its Applications*, New Orleans, LA, July 11-14, 2005. (Invited minisymposium)
194. Inverse problems in computational cardiac electromechanics, *SIAM Conference on Optimization*, Stockholm, Sweden, May 15–19, 2005. (Invited minisymposium)
195. Cyberinfrastructure-enabled simulation-based optimization: opportunities and challenges *NSF Workshop on Cyberinfrastructure in Engineering Design*, Arlington, VA, February 28 – March 1, 2005. (Invited workshop)
196. Challenges in Optimization of Multiscale Systems, *Sandia Computer Science Research Institute Workshop on Multiscale Mathematics*, Albuquerque, New Mexico, December 13–15, 2004. (Invited workshop)
197. Image-based elastic registration for patient-specific finite element model generation, *Special Session on PDE-Based Methods in Imaging and Vision, American Mathematical Society Fall Eastern Section Meeting*, Pittsburgh, PA, November 6–7, 2004. (Invited special session)
198. Challenges in Multiscale Optimization, *Third DOE Workshop on Multiscale Mathematics*, September 21, 2004, Portland, Oregon. (Invited workshop)

199. Scalability Issues in Multiscale Computation, *Third DOE Workshop on Multiscale Mathematics*, September 21, 2004, Portland, Oregon. (Invited workshop)

200. A level-set fictitious domain Newton method for shape optimization, *Conference on PDEs, Scientific Computing and Optimization in Applications*, Trier, Germany, September 8-10, 2004. (Invited plenary)

201. Multiscale Optimization for Inverse Earthquake Modeling, *SIAM Annual Meeting*, Portland, OR, July 12-16, 2004. (Invited minisymposium)

202. Large-scale geophysical inversion, *Summer School on Mathematical Geophysics and Uncertainty in Earth Models*, Golden, CO, June 14-25, 2004. (Invited lecturer)

203. Simulation-based engineering science: from design to decision-making, *NSF Engineering Directorate ITR meeting*, Crystal City, VA, June 11, 2004.

204. Parallel algorithms for CFD-based optimal control and shape optimization, *Parallel CFD 2004*, Gran Canaria, Canary Islands, May 24-27, 2004. (Invited minisymposium)

205. Image-based Deformable Registration for Patient-Specific Surgical Simulation, *SIAM Conference on Imaging Science*, Salt Lake City, UT, May 2-4, 2004. (Invited minisymposium)

206. Simulation of Flows with Dynamic Interfaces on Terascale Computers, *NSF Shared Cyberinfrastructure PI Meeting*, Arlington, VA, February 18-20, 2004.

207. Optimization of time-dependent PDE systems: Challenges and opportunities, *Oberwolfach Workshop on Instationary Control*, Oberwolfwach, Germany, January 18-24, 2004. (Invited workshop)

208. Saddle point problems in PDE-constrained optimization, *Sandia Computer Science Research Institute Workshop on Saddle Point Methods*, Santa Fe, December 6, 2003. (Invited workshop)

209. Eulerian methods for shape optimization, *Workshop on Nonlinear Solvers*, Lawrence Livermore National Laboratory, August 8, 2003. (Invited workshop)

210. Eulerian methods for shape optimization, *Scientific Computing and Differential Equations (SciCADE 2003)*, Trondheim, Norway, July 1, 2003. (Invited minisymposium)

211. NSF/SIAM Workshop on Computational Science and Engineering, Mathematics, and Computer Science, Arlington VA, March 24, 2003. (Invited panelist)

212. Newton-Krylov methods for seismic inversion, *Oberwolfach Workshop on Numerical Techniques for Optimization with PDE Constraints*, Oberwolfwach, Germany, February 17, 2003. (Invited workshop)

213. Parallel preconditioned Newton-Krylov methods for inverse wave propagation, *SIAM Conference on Computational Science and Engineering*, San Diego, CA, February 12, 2003. (Invited minisymposium)

214. Large-scale source and material inversion for earthquake ground motion modeling, *SIAM Conference on Computational Science and Engineering*, San Diego, CA, February 10, 2003. (Invited minisymposium)

215. Introduction to PDE constrained optimization, *Workshop on Optimization in Simulation-Based Models*, Institute for Mathematics and Its Applications, University of Minnesota, Minneapolis, MN, January 7, 2003.

216. Terascale forward and inverse earthquake modeling, *Pittsburgh Supercomputing Center Booth talk*, SC2002, November 19, 2002.

217. Towards petascale forward and inverse earthquake modeling, *UK-US Workshop on Petascale Computing*, London, UK, October 1, 2002. (Invited workshop)

218. Parallel multiscale Newton Krylov methods for inverse wave propagation, *SIAM Conference on Optimization*, Toronto, Canada, May 20, 2002. (Organized workshop)
219. Scalable Newton Krylov methods for inverse wave propagation, *Workshop on Inverse Problems and Uncertainty*, Institute for Mathematics and Its Applications, University of Minneapolis, Minneapolis, MN, April 26, 2002. (Invited workshop)
220. Multiscale Newton-Krylov methods for inverse wave propagation, *Copper Mountain Conference on Iterative Methods*, Copper Mountain CO, March 25, 2002. (Invited session)
221. Multiscale domain decomposition methods for inverse wave propagation, *Domain Decomposition 14*, Cocoyoc, Mexico, January 11, 2002.
222. Workshop on Sensitivity Analysis, Lawrence Livermore National Laboratory, Livermore, CA, August 16-17, 2001.
223. Lagrange-Newton-Krylov-Schur methods for optimal control of systems governed by PDEs, *SIAM Conference on Control and its Applications*, San Diego, CA, July 13, 2001. (Invited minisymposium)
224. Adjoint Newton-Krylov algorithms for optimization of time-dependent PDE systems, *SIAM Conference on Control and its Applications*, San Diego, CA, July 11, 2001. (Invited minisymposium)
225. PDE-constrained optimization as an enabling technology for dynamic data-driven application systems, *International Conference on Supercomputing*, Sorrento, Italy, June 20, 2001. (Invited panel)
226. Algorithmic challenges for PDE-constrained optimization, *First Sandia Workshop on PDE-Constrained Optimization*, Santa Fe, NM, April 4, 2001.
227. Parallel Newton-Krylov methods for PDE-constrained optimization, SIAM Conference on Parallel Processing for Scientific Computing, Norfolk, VA, March 12, 2001. (Invited minisymposium)
228. Large-scale PDE-constrained optimization: Newton-Krylov algorithms and applications to optimal flow control and seismic inversion, *7th US-Mexico Workshop in Numerical Analysis*, Merida, Mexico, January 8, 2001. (Invited workshop)
229. Earthquake modeling on terascale computers, *Pittsburgh Supercomputing Center Booth*, Supercomputing 2000, Dallas, TX, November 8, 2000.
230. Microstructural blood flow modeling on terascale computers, *Pittsburgh Supercomputing Center Booth*, Supercomputing 2000, Dallas, TX, November 8, 2000.
231. Parallel algorithms for large-scale PDE-constrained optimization, *SIAM Conference on Computational Science and Engineering*, September 23, 2000, Washington, DC. (Invited minisymposium)
232. Multiprocessor computing: A shift in the optimization paradigm? *AIAA Symposium on Multidisciplinary Analysis and Optimization*, Long Beach, CA, September 6, 2000. (Invited panel)
233. PDE-constrained optimization: Algorithms, software, and optimal flow control applications, *International Symposium on Mathematical Programming*, Atlanta, GA, August 11, 2000. (Invited minisymposium)
234. PDE solvers and PDE optimizers: Similarities and differences, *Lawrence Livermore National Laboratory Workshop on Nonlinear Solvers*, Pleasanton, CA, July 28, 2000. (Invited workshop)
235. Large-scale PDE-constrained optimization, *Workshop on Computational Materials Modeling*, Carnegie Mellon University, Pittsburgh, PA, December 8, 1999.
236. Scalability of parallel SQP algorithms for optimal design and control, *SIAM Conference on Optimization*, Atlanta, GA, May 10, 1999.

237. Research directions in PDE-constrained optimization on multi-teraflops computers, *NSF Workshop on Algorithms for the New Millenium*, Washington, DC, July 9, 1998. (Invited workshop)
238. Parallel unstructured mesh ground motion modeling, *SCEC Workshop on Ground Motion Modeling*, San Diego, June 19, 1996. (Invited workshop)
239. Large-scale optimal design, *Workshop on Large-Scale Optimization*, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN, July 13, 1995. (Invited workshop)
240. Parallel optimal design: Algorithms and applications, *ICASE/LaRC Workshop on Multidisciplinary Design Optimization*, Hampton, VA, March 15, 1995.

C. Invited University, National Lab, Government Agency, and Industry Lectures

240. TBA, *GFDL Seminar Series*, Geophysical Fluid Dynamics Laboratory, Princeton, NJ, May 6, 2021
241. Parsimonious structure-exploiting deep neural network surrogates for Bayesian inverse problems, *MOX Colloquia*, Modeling and Scientific Computing Lab, Department of Mathematics, Politecnico di Milano, Italy, November 12, 2020.
242. Large-scale PDE-constrained stochastic optimization, *Operations Research & Industrial Engineering Seminar Series*, The University of Texas at Austin, October 16, 2020.
243. Machine Learning for Inferring Scientific Models: Hope or Hype?, Shell, Houston, TX, January 29, 2020.
244. Learning from data through the lens of models: Large-scale Bayesian inversion and applications to the flow of the Antarctic ice sheet, University of Illinois Urbana Champaign, April 30, 2019.
245. Large-scale Bayesian inversion with applications to flow of the Antarctic ice sheet, *Department of Computational Mathematics, Science, and Engineering Colloquium*, Michigan State University, April 1, 2019.
246. Large-scale Bayesian inversion with applications to flow of the Antarctic ice sheet, *Charlemagne Distinguished Lecture*, RWTH Aachen University, Germany, October 29, 2018.
247. Large-scale Bayesian inversion with applications to flow of the Antarctic ice sheet, *Lindbergh Lecture*, Department of Mechanical Engineering, University of Wisconsin–Madison, April 26, 2018.
248. Large Scale Bayesian Inversion for Flow of the Antarctic Ice Sheet, *Colloquium*, Department of Civil & Environmental Engineering, Duke University, April 4, 2017.
249. Large-scale Bayesian inversion and the flow of the Antarctic ice sheet, *Mathematics Colloquium*, Department of Mathematics, University of Houston, November 9, 2016.
250. Extreme-scale Bayesian inverse problems, with application to flow of the Antarctic ice sheet, *NSCI Seminar Series*, National Institute for Standards and Technology (NIST), November 2, 2016.
251. Bayesian inversion for large scale Antarctic ice sheet flow, *Department Colloquium*, Department of Earth and Planetary Sciences, Harvard University, October 3, 2016.
252. Parameter space: The next frontier, *TACC Advanced Computing Symposium*, Texas Advanced Computing Center, Austin, TX, June 2, 2016.
253. Optimal control of systems governed by PDEs with random parameter fields using quadratic approximations, *Computer Science Research Institute Seminar*, Sandia National Laboratories, Albuquerque, NM, May 23, 2016.

254. Quantifying and managing uncertainties in large-scale complex models, with applications to flow of the Antarctic ice sheet, *Central Valley SIAM Regional Student Conference*, UC Merced, Merced, CA, April 29, 2016.

255. Bayesian Inversion for Large Scale Antarctic Ice Sheet Flow, *Caltech Computing + Mathematical Sciences Colloquium Series*, Caltech, Pasadena, CA, May 18, 2015.

256. Bayesian Inversion for Large Scale Antarctic Ice Sheet Flow, *Distinguished Speaker Series in Scientific Computing*, Centre for Scientific Computing and PIMS, Simon Fraser University, Burnaby, BC, Canada, April 10, 2015.

257. Integrating Big Data and Big Models via Bayesian Inversion, with Application to Large Scale Antarctic Ice Sheet Flow, *University of Buffalo Computation and Data Enabled Science and Engineering Program kickoff symposium*, March 23, 2015.

258. Bayesian Inversion for Large Scale Antarctic Ice Sheet Flow, *ICES Babuska Forum Seminar*, Austin, TX, February 13, 2015.

259. Large-scale Bayesian inverse wave propagation, *Acoustics Program Seminars*, Mechanical Engineering Department, The University of Texas at Austin, Austin, TX, April 18, 2014.

260. Towards Bayesian Inversion for Large Scale Antarctic Ice Sheet Flow, *Computer Science Research Institute seminar*, Sandia National Laboratories, Albuquerque, NM, March 11, 2014.

261. Towards Bayesian Inversion for Large Scale Antarctic Ice Sheet Flow, *Frontiers in Earth and Environmental Sciences seminar*, Los Alamos National Laboratory, Los Alamos, NM, March 10, 2014.

262. Towards Bayesian Inversion for Large Scale Antarctic Ice Sheet Flow, *Michigan Institute for Computational Discovery and Engineering*, University of Michigan, Ann Arbor, MI, February 28, 2014.

263. Towards Bayesian Inversion for Large Scale Antarctic Ice Sheet Flow, *Seismolab seminar*, Caltech, Pasadena, CA, January 24, 2014.

264. Large Scale Bayesian Inverse Problems, with Applications to Seismic Inversion, *Department of Applied Mathematics & Statistics Colloquia*, Colorado School of Mines, Golden, CO, September 21, 2012.

265. Uncertainty Quantification in Large Scale Seismic Inverse Problems, *CSRI Seminar, Sandia National Laboratories*, Albuquerque, NM, June 4, 2012.

266. Uncertainty Quantification in Geophysical Inverse Problems: Opportunities and Challenges, Departamento de Matemática, Escuela Politécnica Nacional, Quito, Ecuador, March 16, 2012.

267. Large-scale stochastic inversion, with application to global seismic inversion, Sandia National Laboratories, Livermore, CA, December 2, 2011.

268. A Stochastic Newton Method For Large-Scale Statistical Inverse Problems, *MIT Computational Engineering Seminar Series*, Massachusetts Institute of Technology, Cambridge, MA, May 12, 2010.

269. Towards Uncertainty Quantification for Large-scale Inverse Problems, *Robert J. Melosh Medal Competition for Best Student Paper in Finite Elements*, Duke University, Durham, NC, April 30, 2010.

270. Petascale adaptive mesh methods with applications to solid earth geophysics problems, *Scientific Computing and Imaging Institute Distinguished Lecture Series*, University of Utah, Salt Lake City, UT, April 23, 2010.

271. Parallel large-scale adaptive mesh PDE solution and applications to multiscale problems in solid earth geophysics, KAUST, Thuwal, Saudi Arabia, January 20, 2010.
272. Parallel adaptive mesh methods on petascale computers, with application to geophysical problems, *Frontiers in Geoscience Seminar Series*, Earth and Environmental Sciences Division, Los Alamos National Laboratory, June 1, 2009.
273. Parallel adaptive mesh refinement with geoscience applications, *TAMU KAUST Spring Symposium*, Texas A&M University, College Station, TX, May 28–29, 2009
274. Parallel Adaptive Mesh Methods on Petascale Computers, with Applications to Geophysical Problems, National Center for Atmospheric Research, Boulder, CO, May 19, 2009.
275. Stochastic Newton Method for Statistical Inverse Problems Governed by PDEs, National Center for Atmospheric Research, Boulder, CO, May 19, 2009.
276. A stochastic Newton method for statistical inverse problems governed by PDEs, *Operations Research and Industrial Engineering seminar series*, The University of Texas at Austin, Austin, TX, May 1, 2009.
277. Bridging deterministic and stochastic approaches in the solution of large-scale PDE-based statistical inverse problems, *DOE Advanced Scientific Computing Advisory Committee*, Gaithersburg, MD, October 28, 2008.
278. Stochastic Newton MCMC for sampling expensive probability densities in high dimensions, *Center for Applied Scientific Computing Seminar*, Lawrence Livermore National Laboratory, Livermore, CA, October 10, 2008.
279. Parallel scalable adaptive mesh refinement, with applications to mantle convection modeling, *Computer Science Research Institute Seminar*, Sandia National Laboratories, Albuquerque, NM, July 10, 2008.
280. Fast optimization methods and their potential for quantifying uncertainty in inverse problems, *Exploration Geophysics Seminar*, Department of Geological Sciences, The University of Texas at Austin, February 7, 2008.
281. Opportunities and Challenges in Computational Geodynamics (with M. Gurnis, Caltech), National Science Foundation, Arlington, VA, November 28, 2007.
282. The Path to Petascale Computing: Opportunities for Texas Leadership (with J. Boisseau and K. Pingali), *Joint ICES/CS Seminar*, The University of Texas at Austin, May 24, 2007.
283. Forward and Inverse Earthquake Modeling on Parallel Computers, *Nonlinear Dynamics Seminar*, Department of Physics, University of Texas at Austin, January 29, 2007.
284. Geosciences, Society, and Supercomputing, *Jackson School of Geosciences Fall 2006 Commencement Address*, The University of Texas at Austin, December 9, 2006.
285. Opportunities and challenges for petascale inverse earthquake modeling, *George Tech/Oak Ridge National Laboratories Distinguished Lecture Series*, Atlanta, GA, April 7, 2006.
286. Full waveform elastodynamic-based earthquake inversion: A challenge for petascale computing, *Scientific Computing Seminar*, Institute for Theoretical and Engineering Science, Department of Mathematics, University of Houston, Houston, TX, March 22, 2006.
287. Large-scale inverse wave propagation, *ICES Forum*, Institute for Computational Engineering and Sciences, University of Texas at Austin, Autin, TX, February 10, 2006.
288. Algorithms for large-scale inverse problems and prospects for application to control and inversion of contaminant transport in porous media, *Hydrogeology Brown Bag Seminar*, Department of Geological Sciences, University of Texas at Austin, Autin, TX, January 27, 2006.

289. Large-Scale Inverse Earthquake Modeling, *Exploration Geophysics Seminar*, Department of Geological Sciences, University of Texas at Austin, Austin, TX, October 6, 2006.

290. A PDE-Constrained Optimization Approach to Large-Scale Earthquake Inversion, *Distinguished Speaker Series in Computation for Design and Optimization*, Massachusetts Institute of Technology, September 14, 2005.

291. PDE-constrained Optimization: Algorithms and Applications, *Stanford University, Institute for Computational and Mathematical Engineering*, March 31, 2005.

292. Multiscale Earthquake Inversion, Mathematics Department Colloquium, University of Pittsburgh, September 24, 2004.

293. Multiscale Newton-Krylov Methods for Inverse Earthquake Modeling on Terascale Computers, Institute for Computational Engineering and Sciences seminar, University of Texas at Austin, April 13, 2004.

294. Multiscale methods for inverse earthquake modeling, Applied Mathematics Colloquium, Department of Applied Physics and Applied Mathematics, Columbia University, September 23, 2003.

295. Large-scale PDE-constrained optimization: Parallel algorithms and applications to inverse earthquake modeling, Computational Science and Engineering Program, University of California, Santa Barbara, May 29, 2003.

296. Towards forward and inverse earthquake modeling on petaflops computers, *Center for Computational Sciences*, University of Kentucky, Lexington, KY, April 23, 2003.

297. Forward and inverse earthquake modeling on terascale computers, *Computational Science Seminar*, College of William and Mary, Williamsburg, VA, April 7, 2003.

298. Multiscale methods for inverse seismic wave propagation, *Center for Nonlinear Analysis Seminar*, Department of Mathematical Sciences, Carnegie Mellon University, Pittsburgh, PA, February 27, 2003.

299. Towards inverse earthquake modeling, *President's Distinguished Lecture on Information Technology*, Rensselaer Polytechnic Institute, Troy, NY, October 11, 2002.

300. Dynamic meshes, dynamic interfaces, and hemodynamics, *Computational Science and Engineering Symposium*, University of Illinois, Urbana-Champaign, IL, April 16, 2002.

301. Dynamic meshes, dynamic interfaces, and hemodynamics, *Scientific Computing Seminar Series*, Brown University, Providence, RI, April 5, 2002.

302. Multiscale methods for inverse wave propagation, *Robert J. Melosh Medal Competition for Best Student Paper in Finite Elements*, Duke University, Durham, NC, March 29, 2002.

303. Multiscale Newton-Krylov methods for inverse wave propagation, *Applied Mathematics Seminar*, University of Colorado, Boulder CO, March 22, 2002.

304. Parallel Newton-Krylov algorithms for large-scale PDE-constrained optimization, *Scientific Computing and Computational Mathematics Seminar*, Stanford University, Stanford, CA, May 14, 2001.

305. Dynamic Meshes, Dynamic Interfaces, and Hemodynamics *Courant Institute for Mathematical Sciences Seminar*, New York University, NY, March 9, 2001.

306. Multiscale Newton-Krylov methods for inverse wave propagation, *Computer Science Research Institute Seminar*, Sandia National Laboratries, Albuquerque, NM, February 27, 2002.

307. Dynamic meshes, dynamic interfaces, and hemodynamics, *Computer Science Research Institute seminar*, Sandia National Laboratories, Livermore, CA, January 21, 2002.

308. Dynamic meshes, dynamic interfaces, and hemodynamics, *Center for Advanced Scientific Computing Seminar*, Lawrence Livermore National Laboratory, Livermore, CA, July 2, 2001.
309. Dynamic meshes, dynamic interfaces, and hemodynamics, *Computer Science Research Institute*, Sandia National Laboratries, Albuquerque, NM, June 27, 2001.
310. Dynamic meshes, dynamic interfaces, and hemodynamics, *Institute for Terascale Simulation Seminar*, Lawrence Livermore National Laboratory, Livermore, CA, June 13, 2001.
311. Towards rational blood flow modeling, *Center for Nonlinear Analysis Seminar*, Department of Mathematical Sciences, Carnegie Mellon University, Pittsburgh, PA, October 27, 1998.
312. Earthquake ground motion modeling on parallel computers, *Department of Mechanical Engineering Seminar*, University of Pittsburgh, December 3, 1996.
313. Towards rational blood flow modeling, *Center for Medical Robotics and Computer Assisted Surgery Seminar*, Robotics Institute, Carnegie Mellon University, Pittsburgh, PA, November 11, 1998.
314. Large-scale PDE-constrained optimization, *Computer Science Research Institute seminar*, Sandia National Laboratories, Albuquerque, NM, August 4, 2000.
315. Massively parallel algorithms for large-scale simulation-based optimization, NASA Langley Research Center, April 7, 2000.
316. Large-scale PDE-constrained optimization: Parallel algorithms and applications to optimal design, optimal contriol, and inverse problems, *Center for Applied Scientific Computing seminar*, Lawrence Livermore National Laboratory, March 29, 2000.
317. Large-scale PDE-constrained optimization: Parallel algorithms and applications to optimal design, optimal contriol, and inverse problems, *Computer Science Research Institute*, Sandia National Laboratories, Livermore, CA, March 24, 2000.
318. Large-scale PDE-constrained optimization: Parallel algorithms and applications to optimal design, optimal control, and parameter estimation problem, *Computational and Applied Mathematics Proseminar*, Arizona State University, Tempe, Arizona, March 6, 2000.
319. Towards multiscale blood flow modeling, *Department of Mechanical Engineering Seminar*, University of Pittsburgh, Pittsburgh, PA, November 20, 1998.
320. Towards scalable CFD-based optimization, NASA-Langley Research Center, Hampton, VA, November 6, 1998.
321. Algorithms for large-scale unstructured mesh computations on parallel computers, NASA Ames Research Center, Mountain View, CA, February 16, 1998.
322. Large-scale PDE-constrained optimization on parallel computers, *Institute for Computer Applications in Science and Engineering Seminar*, NASA Langley Research Center, Hampton, VA, July 29, 1997.
323. Computational issues associated with earthquake ground motion modeling, National Science Foundation, July 10, 1997.

D. Contributed Seminars and Talks

324. An Extreme-Scale Implicit Solver for Complex PDEs: Highly Heterogeneous Flow in Earth's Mantle, *SC15*, Austin, TX, November 19, 2015.
325. Extreme scale UQ for Bayesian inverse problems governed by PDEs, *SC12*, Salt Lake City, UT, November 13, 2012.

326. Extreme scale AMR, *SC2010*, New Orleans, LA, November 16, 2010.
327. Parallel adaptive mantle convection simulation on petascale supercomputers, *SC2008*, Austin, TX, November 19, 2008.
328. A parallel multigrid method for large scale inverse transport, *World Congress on Computational Mechanics*, Los Angeles, CA, July 16–22, 2006.
329. A parallel multigrid method for large-scale data assimilation, *SIAM Conference on Parallel Processing for Scientific Computing*, San Francisco, CA, February 22–25, 2006.
330. Dynamic data-driven inversion for terascale simulations: Real-time identification of airborne contaminants, *SC2005*, Seattle, WA, November 12–18, 2005.
331. An optimal control approach to elastic image registration, *SIAM Annual Meeting*, New Orleans, LA, July 13, 2005.
332. Parallel elastodynamic inversion for earthquake modeling, *SIAM Conference on Parallel Processing for Scientific Computing*, San Francisco, CA, February 25, 2003.
333. Terascale forward and inverse earthquake modeling, *SC2003*, Phoenix, AZ, November 19, 2003.
334. Multilevel solvers for inverse problems, *Terascale Optimal PDE Simulations Center All-Hands Meeting*, New York, NY, October 19, 2003.
335. Multilevel solvers for inverse problems, *Terascale Optimal PDE Simulations Center All-Hands Meeting*, San Diego, CA, February 13, 2003.
336. Terascale optimal PDE simulations integrated software infrastructure center (TOPS-ISIC), *DOE SciDAC Booth*, SC2002, Baltimore, MD, Novemember 22, 2002.
337. Parallel multiscale Gauss-Newton-Krylov methods for inverse wave propagation, *SC2002*, Baltimore, MD, Novemember 20, 2002.
338. Large-scale inversion and control for systems governed by PDEs, *Caliente Project All Hands Meeting*, Sandia National Laboratories, Albuquerque, NM, July 15, 2002.
339. Multilevel solvers for PDE constrained optimization, *Terascale Optimal PDE Simulations Center All-Hands Meeting*, Philadelphia, PA, July 10, 2002.
340. Computational biomechanics and medical devices, *Biomedical Engineering Advisory Board Meeting*, Carnegie Mellon University, Pittsburgh, PA, May 31, 2002.
341. Towards optimal solvers for PDE constrained optimization, *Terascale Optimal PDE Simulations Center All-Hands Meeting* Lawrence Livermore National Laboratory, Livermore, CA, January 25, 2002.
342. Simulation and Optimization at SNL and LLNL, *Department of Civil and Environmental Engineering Seminar*, Carnegie Mellon University, September 28, 2001.
343. Multiscale blood flow modeling on terascale computers, *Sangria Project All Hands Meeting*, McGowan Center for Artificial Organs, University of Pittsburgh Medical Center, September 29, 2001.
344. Large-scale optimization for inversion and control of dynamic simulations, *ITR Project kick-off meeting*, Pittsburgh, PA, October 20, 2001.
345. Multiscale Newton-Krylov algorithms for inverse seismic wave propagation, *Applied Inverse Problems: Theoretical and Computational Aspects*, Montecatini Terme, Italy, June 18, 2001.
346. Lagrange-Newton-Krylov-Schur methods for optimal control of Navier-Stokes flows, *Applied Inverse Problems: Theoretical and Computational Aspects*, Montecatini Terme, Italy, June 18, 2001.

347. A multiscale approach to inverse wave propagation, *Symposium on Advanced Multiscale and Multiresolution Methods*, Yosemite National Park, California, October 31, 2000.

348. Blood flow modeling on teraflops computers, *CAE/CM seminar*, Carnegie Mellon University, September 15, 2000.

349. Scalable parallel SQP methods for optimization of viscous flows, AIAA Symposium on Multidisciplinary Analysis and Optimization, Long Beach, CA, September 6, 2000.

350. Seismic Inversion, *Quake Project All Hands Meeting*, Carnegie Mellon University, June 6, 2000.

351. Large-Scale Simulation-Constrained Optimization, *NSF/Sandia LCE Program Review*, Albuquerque, March 3, 2000.

352. Parallel domain decomposition methods for optimal control of viscous incompressible flows, *Parallel CFD 1999*, Williamsburg, VA, May 23, 1999.

353. Computational design of artificial organs, *Institute for Complex Engineered Systems Seminar*, Carnegie Mellon University, May 4, 1999.

354. Terascale algorithms for optimization of simulations, *NSF/Sandia LCE Program Review*, Sandia National Laboratories, Albuquerque, NM, March 18, 1999.

355. The graduate program in computational mechanics in Civil and Environmental Engineering at CMU, *Civil and Environmental Engineering State-of-the-Art Workshop*, Carnegie Mellon University, July 13, 1998.

356. Earthquake ground motion modeling in large heterogeneous basins on parallel computers, *Fourth U.S. National Congress on Computational Mechanics*, San Francisco, CA, August 8, 1997.

357. Large-scale optimization on parallel computers, *Synthesis Lab Seminar*, Engineering Design Research Center, Carnegie Mellon University, July 7, 1997.

358. Modeling seismic wave propagation in large basins on parallel computers, *Fourth SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Albuquerque, NM, June 18, 1997.

359. Earthquake ground motion modeling in large heterogeneous basins on parallel computers, *Eighth SIAM Conference on Parallel Processing for Scientific Computing*, Minneapolis, MN, March 15, 1997.

360. Shape optimization of Navier-Stokes flows, *SIAM Conference on Optimization*, Victoria, BC, May 22, 1996.

361. Sensitivity analysis of nonlinear fluid-solid interaction, *Third U.S. National Congress on Computational Mechanics*, Dallas, TX, June 12, 1995.

362. Finite elements in one lecture, *Medical Robotics and Computer-Assisted Surgery seminar*, Carnegie Mellon University, April 14, 1995.

363. Fictitious domain methods for biomechanics simulation, *Medical Robotics and Computer-Assisted Surgery Retreat*, Hidden Valley, PA, March 17, 1995.

364. Variational methods for nonlinear fluid-solid interaction, *Twelfth U.S. National Congress of Applied Mechanics, Seattle*, WA, July 1994.

365. Towards optimal design of artificial hearts, *Workshop on Optimal Design and Control*, Blacksburg VA, April 1994.

366. Variational methods and domain decompostion for nonlinear fluid-structure interaction, *Seventh International Conference on Domain Decomposition Methods*, State College, PA, October 1993.

367. A variational approach to aeroelasticity and its sensitivity analysis, *Second U.S. National Congress on Computational Mechanics*, Washington, DC, August 1993.
368. Some optimization problems in biomechanics, *Center for Medical Robotics and Computer-Assisted Surgery*, Carnegie Mellon University, May 1993.
369. Adaptive methods for partial differential equations, *Scientific Computing Seminar*, Department of Computer Science, Carnegie Mellon University, March 1993.
370. SQP methods for shape optimization on the CM-2, *Second Symposium on Parallel Computational Methods for Large-Scale Structural Analysis and Design*, Norfolk, VA, February 1993.
371. Optimal design of aerospace vehicles, *Synthesis Lab Seminar*, Engineering Design Research Center, Carnegie Mellon University, October 1992.
372. Massively parallel algorithms for optimal design of engineering systems, *SIAM Conference on Optimization*, Chicago, May 1992.
373. Shape optimization on data-parallel computers, *Synthesis Lab Seminar*, Engineering Design Research Center, Carnegie Mellon University, October 16, 1991.
374. Multilevel adaptive finite element solution of problems in linear elastostatics, *First U.S. National Congress on Computational Mechanics*, Chicago, July 24, 1991.
375. Computational strategies for large-scale structural inverse problems, *Structural and Computational Mechanics Seminar*, Department of Civil Engineering, Carnegie Mellon University, September 14, 1990.
376. Current research in shape optimization, *Synthesis Lab Seminar*, Engineering Design Research Center, Carnegie Mellon University, March 8, 1990.
377. Optimal topologies and optimal trusses, *Synthesis Lab seminar*, Engineering Design Research Center, Carnegie Mellon University, September 13, 1989.

E. Conferences and Workshops Organized

1. Co-organizer, *New York Scientific Data Summit*, New York, NY, October 8–9, 2020.
2. Co-organizer, *Workshop on Mathematical Foundations of Data Assimilation and Inverse Problems*, Foundations of Computational Mathematics (FoCM'20), Vancouver, Canada, June 15-24, 2020.
3. Co-organizer, *Workshop on Mathematical Modeling in Glaciology*, Banff International Research Station, Banff, Canada, January 12–17, 2020.
4. Co-organizer, *Workshop on Future Directions in Extreme Scale Computing for Scientific Grand Challenges*, Texas Advanced Computing Center, Austin, TX, January 9–10, 2020.
5. Co-organizer, *Workshop on Big Data, Data Assimilation, and Uncertainty Quantification*, Trimester on Mathematics of Climate and the Environment, Institut Henri Poincaré, Paris, France, November 12–15, 2019.
6. Organizer and instructor, *Short course on Inverse Problems and Uncertainty Quantification*, Trimester on Mathematics of Climate and the Environment, Institut Henri Poincaré, Paris, France, November 4–8, 2019.
7. Co-organizer, *Gene Golub SIAM Summer School on Inverse Problems and Uncertainty Quantification*, Breckenridge, CO, June 17-30, 2018.
8. Co-chair, *2018 SIAM Conference on Imaging Science*, Bologna, Italy, June 2018.

9. Co-organizer, *ICERM IdeaLab: Inverse Problems and Uncertainty Quantification*, Institute for Computational and Experimental Mathematics, Brown University, Providence, RI, July 6–10, 2015.
10. Co-organizer, *Workshop on Large-scale Inverse Problems and Quantification of Uncertainty: Big Data Meets Big Models*, Santa Fe, NM, May 22-24, 2013.
11. Co-organizer, *IMA Workshop on Inverse Problems and Quantification of Uncertainty*, Minneapolis, MN, June 6–10, 2011.
12. Co-organizer, *Workshop on Optimization in Machine Learning*, ICES, Austin, TX, June 6–7, 2011.
13. Co-organizer, *NSF Workshop on Mathematical and Computational Issues in the Solid Earth Geosciences*, Santa Fe, NM, September 15–17, 2008.
14. Co-organizer, *Mathematics: Analysis, Modeling, Optimization and Simulation (MAMOS) Workshop*, Austin, TX, October 15–26, 2007.
15. Co-organizer, *Sandia/NSF/AFOSR Workshop on Uncertainty Quantification and Large-Scale Inverse Problems*, Santa Fe, NM, September 10–12, 2007.
16. Co-organizer, *Computational Infrastructure for Geodynamics Workshop on Challenges and Opportunities at the Interfaces of Scientific Computing and Computational Geodynamics*, Austin, TX, October 16–18, 2006.
17. Co-organizer, *Sandia Workshop on Large Scale Robust Optimization*, Santa Fe, NM, August 31–September 2, 2005.
18. Co-organizer, *Second Sandia Workshop on PDE-Constrained Optimization*, Santa Fe, NM, May 19-22, 2004.
19. Chair of Organizing Committee, *SIAM Conference on Computational Science & Engineering*, San Diego, CA, February 9–13, 2003.
20. Co-organizer, *Workshop on Optimization in Simulation-Based Models*, Institute for Mathematics and Its Applications, University of Minnesota, Minneapolis, MN, Jan 7–16, 2003.
21. Co-organizer, *First Sandia Workshop on PDE-Constrained Optimization*, Santa Fe, NM, April 4–6, 2001.

F. Scientific, Organizing, and Program Committees for Conferences

1. Scientific Committee, *Conference on Uncertainty Quantification in Computational Sciences and Engineering* (UNCECOMP 2021), Athens, Greece, June 21–23, 2021.
2. Scientific Committee, *14th World Congress in Computational Mechanics and ECCOMAS Congress 2020*, Paris, France, July 19–24, 2020.
3. International Organizing Committee (IOC), *5th International Symposium on Inverse Problems, Design, and Optimization (IPDO2019)*, Tianjin, China, September 24–26, 2019.
4. Scientific Organizing Committee, *15th U.S. National Congress on Computational Mechanics (USNCCM15)*, Austin, Texas, July 28–August 1, 2019.
5. Scientific Committee, *3rd International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2019)*, Crete, Greece, June 24–26, 2019.
6. Panels Committee, *SC18: The International Conference for High Performance Computing, Networking, Storage, and Analysis*, Dallas, TX, November 11–16, 2018.

7. International Scientific Organizing Committee, *13th World Congress on Computational Mechanics (WCCM XIII) and 2nd Pan American Congress on Computational Mechanics (PANACM II)*, New York City, NY, July 22–27, 2018.
8. Organizing Committee, *Houston Imaging Sciences Symposium*, SIAM TX-LA Section and SIAM Imaging Science Activity Group, Houston, TX, October 2–3, 2017.
9. Scientific Organizing Committee, *14th U.S. National Congress on Computational Mechanics (USNCCM)*, Montreal, Canada, July 17–20, 2017.
10. Organizing Committee, *SIAM Workshop on Parameter Space Dimension Reduction (DR17)*, Pittsburgh, PA, July 9–10, 2017.
11. Scientific Committee, *2nd International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2017)*, Rhodes, Greece, June 15–17, 2017.
12. Organizing Committee, *CIG '16: Interdisciplinary Directions in Computational Geophysics*, Davis, CA, June 17–24, 2016.
13. Editorial Board Member, *Platform for Advanced Scientific Computing (PASC16)*, Lausanne, Switzerland, June 8–10, 2016.
14. Scientific Committee for Scientific Computing, *7th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2016)* Crete, Greece, June 5–10, 2016.
15. Technical Program Committee for Applications, *SC15: The International Conference for High Performance Computing, Networking, Storage, and Analysis*, Austin, TX, November 2015.
16. Scientific Committee, *1st International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2015)*, Crete, Greece, May 25–27, 2015.
17. Technical Program Committee for Applications, *SC14: The International Conference for High Performance Computing, Networking, Storage, and Analysis*, New Orleans, LA November 2014.
18. Scientific Advisory Committee, *6th International Workshop on Catchment Hydrological Modeling and Data Assimilation (CAHMDA-VI)*, Austin, TX, September 8–12, 2014.
19. Scientific Computing Committee, *Joint 11th World Congress on Computational Mechanics (WCCM XI), 5th European Conference on Computational Methods (ECCM V), 6th European Conference on Computational Fluid Dynamics (ECFD VI)*, Barcelona, Spain, July 20–25, 2014.
20. Program Committee, *IHPCES 2014, Fourth International Workshop on Advances in High-Performance Computational Earth Sciences: Applications & Frameworks*, Cairns, Australia, June 10–12, 2014.
21. Technical Program Committee for Applications, *SC13: The International Conference for High Performance Computing, Networking, Storage, and Analysis*, Denver, CO, November 2013.
22. Scientific Committee, *12th US National Congress on Computational Mechanics*, Raleigh, NC, July 2013.
23. Organizing Committee, *2013 SIAM Annual Meeting*, San Diego, CA, July 8–12, 2013.
24. Scientific Committee, *Inverse Problems, Design, and Optimization Symposium*, Albi, France, June 26-28, 2013.
25. Program Committee, *Third International Workshop on Advances in High-Performance Computational Earth Sciences: (IHPCES)*, Barcelona, Spain, June 5–7, 2013.
26. Organizing Committee, *2013 SIAM Conference on Computational Science and Engineering*, Boston, MA, February 25–March 1, 2013.

27. Program Committee, *2012 International Workshop on Modern Accelerator Technologies for GIScience*, Columbus, Ohio, September 18, 2012.
28. Organizing Committee, *Uncertainty Quantification Summer School*, University of Southern California, August 22–24, 2012.
29. Program Committee, *Second International Workshop on Advances in High-Performance Computational Earth Sciences: Applications and Frameworks (IHPCES)*, Lincoln, NE, June 4–6, 2012.
30. Organizing Committee, *International Workshop of GPU Solutions to Multiscale Problems in Science and Engineering (GPU-SMP 2012)*, Shenzhen, China, June 2–5, 2012.
31. Technical Program Committee, *2012 IEEE International Parallel Distributed Processing Symposium (IPDPS)*, Shanghai, China, May 2012.
32. Organizing Committee, *2012 SIAM Conference on Parallel Processing for Scientific Computing*, Savannah, GA, February 15–17, 2012.
33. Poster Committee, *SC11: The International Conference for High Performance Computing, Networking, Storage, and Analysis*, Seattle, WA, November 2011.
34. Technical Program Committee for Applications, *SC11: The International Conference for High Performance Computing, Networking, Storage, and Analysis*, Seattle, WA, November 2011.
35. Program Committee, *Working with Uncertainty Workshop, IEEE VisWeek*, Providence, RI, October 23, 2011.
36. Program Committee, *First International Workshop on Advances in High-Performance Computational Earth Sciences: Applications and Frameworks (IHPCES)*, Tsukuba, Japan, June 1–3, 2011.
37. Organizing Committee, *2011 SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Long Beach, CA, March 20–24, 2011.
38. Technical Program Committee for Applications, *SC10: The International Conference for High Performance Computing, Networking, Storage, and Analysis*, New Orleans, LA, November 10–16, 2010.
39. International Scientific Committee, *2010 International Conference on Engineering Optimization (EngOpt2010)*, Lisbon, Portugal, September 2010.
40. Scientific Committee, *Summer School on Imaging Sciences and Medical Applications*, July 2010, Coimbra, Portugal.
41. Scientific Committee, *VECPAR'2010 — 9th International Conference on High Performance Computing and Computational Science*, Berkeley, CA, June 22–25, 2010.
42. Program Committee, *2009 IMACS World Congress*, Athens, GA, August 2009.
43. Organizing Committee, *2009 SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Leipzig, Germany, June 2009.
44. Scientific Committee, *10th US National Congress on Computational Mechanics*, Columbus, OH, July 2009.
45. Poster Committee, *SC08: The International Conference for High Performance Computing, Networking, Storage, and Analysis*, Austin, Texas, November, 2008.
46. Scientific Committee, *VECPAR'2008 — 8th International Conference on High Performance Computing and Computational Science*, Toulouse, France, June 24–27, 2008.

47. Science Program Co-chair, *TeraGrid'08*, Las Vegas, NV, June 2008.
48. International Scientific Committee, *6th International Conference on Inverse Problems in Engineering: Theory and Practice (ICIPE 2008)*, Paris, France, June 15–19, 2008.
49. International Scientific Committee, *International Conference on Engineering Optimization*, Rio de Janeiro, June 2–5, 2008.
50. Technical Program Committee, *2008 IEEE International Parallel and Distributed Processing Symposium (IPDPS)*, Miami, Florida, April 2008.
51. Chair, Technical Program Committee for Applications, *SC07: The International Conference for High Performance Computing, Networking, Storage, and Analysis*, Reno, Nevada, November 10–16, 2007.
52. Technical Advisory Board, *9th US National Congress on Computational Mechanics*, San Francisco, CA, July 22–26, 2007.
53. International Advisory Board, *ECCOMAS Conference on Computational Methods in Structural Dynamics and Earthquake Engineering*, Crete, Greece, June 13-15, 2007.
54. Site Characterization and Model Calibration Panel Co-Leader, *DOE Office of Science Workshop on Computational Subsurface Sciences*, Bethesda, Maryland, January 9–12, 2007.
55. Scientific Advisory Board, *Seventh World Congress on Computational Mechanics*, Los Angeles, California, USA, July 16–22, 2006.
56. Program Committee, *Workshop on Advances in Continuous Optimization*, Reykjavik, Iceland, June 30–July 1, 2006.
57. Organizing Committee, *SIAM Conference on Parallel Processing for Scientific Computing*, February 22–25, 2006.
58. International Scientific Committee, *6th World Conference on Structural and Multidisciplinary Optimization (WCSMO6)*, Rio de Janeiro, May 30–June 3, 2005.
59. Organizing Committee, *SIAM Conference on Computational Science and Engineering*, Orlando, FL, February 11-15, 2005.
60. Organizing Committee, *SIAM Conference on Parallel Processing for Scientific Computing*, February 25–27, 2004.
61. Superchair, *Seventh AIAA Symposium on Multidisciplinary Analysis and Optimization*, St. Louis, MO, September, 1998.

G. Editorial Boards

1. Advisory Board, *Data Centric Engineering*, 2019–
2. Editorial Board, *Foundations of Data Science*, 2019–
3. Guest Editorial Board, *SIAM/ASA Journal on Uncertainty Quantification*, special section on parameter dimension reduction, 2017–2019
4. Editorial Board, *SIAM News*, 2015–2017.
5. Guest Editorial Board, *SIAM Journal of Scientific Computing* special issue in association with the 2015 SIAM Conference on Computational Science and Engineering, 2015–2016.
6. Editorial Board, *Research in the Mathematical Sciences* (a Springer open access journal), 2014–
7. Associate Editor, *International Journal of Modeling and Simulation for the Petroleum Industry*, 2013–

8. Associate Editor, *Journal of Parallel and Distributed Computing*, 2011–2017
9. Editorial Board, *International Journal of Geomathematics*, 2011–2016
10. Editorial Board, *International Journal for Uncertainty Quantification*, 2010–XX, 2019–
11. Editorial Board, *SIAM Book Series on Computational Science & Engineering*, 2009–2021.
12. Editorial Board, *Inverse Problems*, 2007–2010.
13. Editorial Board, *The Open Applied Mathematics Journal*, 2007–2013
14. Editorial Board, *Advances in Computational Science and Technology*, 2007–
15. Guest Editor, *Inverse Problems*, Special Issue on Computational Inverse Problems and Uncertainty, 2007.
16. Guest Editorial Board, *SIAM Journal on Scientific Computing*, Special Issue on Computational Science & Engineering, 2007.
17. Editorial Board, *Far-East Journal of Mathematics*, 2006–XX
18. Editorial Board, *Mathematical Modeling and Applied Computing*, 2006–
19. Associate Editor, *SIAM Journal on Scientific Computing*, 2005–2008, 2008–2011
20. Editorial Board, *Computer Methods in Applied Mechanics and Engineering*, 01/05–
21. Founding Editor-in-Chief, *SIAM Book Series on Computational Science & Engineering*, 2/03–8/09.
22. Editorial Board, *International Journal for Multiscale Computational Engineering*, 10/02–

H. National and International Scientific, Government, and Professional Committees

1. Member, *Sensitivity analysis and Uncertainty Quantification Working Group, Mathematical and Computational Sciences (MCS) Special Interest Group (SIG), International Society of Pharmacometrics (ISoP)*, 2021–
2. Member, *Scientific Advisory Board for the Max Planck Institute for Dynamics of Complex Technical Systems*, Magdeburg, Germany, 2020–2026.
3. Chair, *SIAM Activity Group on Uncertainty Quantification*, 2019–2020.
4. Member, *Gene Golub SIAM Summer School Committee*, 2019–2022.
5. Member, *SIAM Imaging Science Best Paper Prize and Early Career Prize Committee*, 2019.
6. Member, German Excellence Initiative external review panel for Karlsruhe Institute of Technology, 2019.
7. Member, *DOE Defense Programs Advisory Committee on High Performance Computing*, 2018–2019.
8. Judge, student poster competition, *IGA 2018 Conference*, Austin, Texas, October 2018.
9. Member, *Nominating Committee for Officer Election for SIAM Activity Group on Geosciences*, 2018.
10. Member, *Nominating Committee for Officer Election for SIAM Activity Group on Computational Science and Engineering*, 2018.
11. External Evaluation Committee, *INRIA Earth, Environmental and Energy Sciences Theme*, Rungis, France, 2018.
12. External Visiting Review Committee, *Computational Science and Engineering PhD and MS programs*, Georgia Tech, 2017-2018.

13. External Scientific Committee, *Energy and Environment Solutions (E2S) Initiative*, French Excellence Initiative project for a consortium led by the University of Pau, National Institute for Agronomy (INRA), and Institute for Research in Computer Science and Automation (INRIA), 2017–
14. External review committee, *Heidelberg Institute for Theoretical Studies*, Heidelberg, Germany, July 2017.
15. Judge, *6th Bavarian Graduate School of Computational Engineering Student Paper Prize*, 2017 SIAM Computational Science and Engineering Conference, Atlanta, GA, February 2017.
16. Chair, *Executive Committee, Computational Infrastructure for Geodynamics (CIG)*, 2016–2017.
17. Chair, *Nominating Committee for Officer Election for SIAM Activity Group on Uncertainty Quantification*, 2016.
18. Member, *Scientific Advisory Board (SAB) of PalMod (German Paleo Climate Modeling Initiative*, Germany, 2016–2019, 2019–2022
19. Member, *IRIS High Performance Computing and Seismic Data Working Group*, 2016–2017.
20. Program Director, *SIAM Activity Group on Imaging Science*, 2016-2017.
21. Member, *Joint Policy Board for Mathematics Committee for 2016 Math Awareness Month*, 2015-2016.
22. Judge, *5th Bavarian Graduate School of Computational Engineering Student Paper Prize*, 2015 SIAM Computational Science and Engineering Conference, Salt Lake City, UT, March 2015.
23. Member, *National Academies Committee on Models of the World*, 2015–2016.
24. Member, *Executive Committee, Computational Infrastructure for Geodynamics (CIG)*, 2015–2016.
25. Advisory Board, *Strategic Research Center for Uncertainty Quantification*, King Abdullah University of Science and Technology (KAUST), Saudi Arabia, 2014–2016
26. Chair, *External Advisory Board, Enabling Quantification of Uncertainty for Large-Scale Inverse Problems (EQUIP)*, United Kingdom, 2013–2018
27. International Scientific Advisory Committee, *Center for Mathematical Modeling*, Escuela Politécnica Nacional de Quito, Ecuador, 2013–
28. Steering Committee, *Managing Uncertainty in Complex Models Community Organization*, 2012–2013
29. Member, *Nominating Committee for SIAM Geociences Activity Group Officer Election*, 2012
30. Member, *External Visiting Committee, College of Engineering and Computational Sciences, Colorado School of Mines*, 2012
31. Member, *Nominating Committee for SIAM Imaging Sciences Activity Group Officer Election*, 2011
32. Judge, *3rd Bavarian Graduate School of Computational Engineering Student Paper Prize*, 2011 SIAM Computational Science and Engineering Conference, Reno, Nevada, March 2011
33. Member, *National Research Council of the National Academies Committee on Mathematical Foundations of Validation, Verification, and Uncertainty Quantification*, 2010-2012
34. Member, *Oversight Committee for Gene Golub SIAM Summer School Program*, 2010–2011.
35. Member, *Committee on Breakthroughs in Applied Mathematics*, Department of Energy, Office of Advanced Scientific Computing Research, 2009-2010

36. Co-Chair, *NSF Advisory Committee for Cyberinfrastructure Task Force on Grand Challenges*, National Science Foundation, 2009–2011.
37. Member, *Petascale Applications Advisory Committee*, NCSA Blue Waters Project, 2009
38. Chair, *SIAM Geosciences Prize Committee*, 2008-2009
39. Member, *Sandia National Laboratories Computer and Information Sciences Research Foundation External Panel Review*, 2007–2011.
40. Member, *IEEE Sidney Fernbach Award Committee*, 2007.
41. Member, *SIAM Ad Hoc Committee on Proceedings*, 2006-2007
42. Member, *Science Steering Committee, Computational Infrastructure for Geodynamics (CIG)*, 2005–2010 (reelected in 2007).
43. Member, *SIAM Program Committee*, 2004–2009.
44. Founding Program Director, *Computational Science & Engineering Activity Group*, Society for Industrial and Applied Mathematics (SIAM), 7/01–12/06 (two terms).
45. External Review Panel, *NSF-Partnerships for Advanced Computational Infrastructure Program (NCSA and NPACI)*, 8/98–8/01.
46. External Review panel, *Center for the Simulation of Advanced Rockets*, University of Illinois, Department of Energy Accelerated Strategic Computing Initiative–Academic Strategic Alliances Program, 2000, 2001, 2003, 2005.
47. Chair, *AIAA Multidisciplinary Design Optimization Awards Committee* (awards AIAA MDO Award and AIAA MDO Best Paper Award), 4/97–4/99
48. Member, *AIAA Technical Committee for Multidisciplinary Design Optimization*, 5/95–4/99

I. Co-organized Minisymposia or Sessions

1. Optimal Experimental Design in Computational Science and Engineering, *16th U.S. National Congress on Computational Mechanics*, Chicago, Illinois, July 25–29, 2021.
2. Forward and Inverse Viscous Flow Problems, *SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Milan, Italy, June 21–24, 2021.
3. Advances in Bayesian Inversion in the Geosciences, *SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Milan, Italy, June 21–24, 2021.
4. Advances in Bayesian optimal experimental design, *SIAM Conference on Computational Science & Engineering*, Forth Worth, Texas, March 1–5, 2021.
5. Optimal design in inverse problems and data assimilation, *IFIP TC7 Conference on System Modelling and Optimization*, Quito, Ecuador, August 31–Sept 4, 2020. (Postponed)
6. Optimal experimental design in computational science and engineering, *14th World Congress in Computational Mechanics and ECCOMAS Congress 2020*, Paris, France, July 19–24, 2020. (Rescheduled to a virtual conference in January 2021)
7. Advances in Bayesian optimal experimental design, *SIAM Conference on Uncertainty Quantification*, Munich, Germany, March 24–27, 2020. (Cancelled)
8. PDE-constrained optimization under uncertainty I–II, *9th International Congress on Industrial and Applied Mathematics (ICIAM 2019)*, Valencia, Spain, July 15–19, 2019.
9. Recent Advances in Optimal Experimental Design I–III, *Applied Inverse Problems*, Grenoble, France, July 8–12, 2019.

10. Large-Scale Optimal Experimental Design, *SIAM Conference on Computational Science and Engineering*, Spokane, WA, February 25-March 1, 2019.
11. Exa/Post-Peta Scale Computational Mechanics, *World Congress on Computational Mechanics (WCCM XIII)*, New York City, NY, July 22-27, 2018.
12. Characterizing Model Inadequacy in Bayesian Inference I–III, SIAM Conference on Uncertainty Quantification, Garden Grove, CA, April 16–19, 2018.
13. Advances in Reduced Order Modeling for Uncertainty Quantification I–II, SIAM Conference on Uncertainty Quantification, Garden Grove, CA, April 16–19, 2018.
14. Large-scale Simulation in Geodynamics I–II, *SIAM Conference on Parallel Processing for Scientific Computing*, Tokyo, Japan, March 7–10, 2018.
15. Efficient Algorithms for Bayesian Inverse Problems Governed by PDE Forward Problems I–II, *SIAM Conference on Computational Science and Engineering*, Atlanta, GA, February 27–March 3, 2017.
16. PDE-Constrained Optimal Control Under Uncertainty I–II, *SIAM Conference on Computational Science and Engineering*, Atlanta, GA, February 27–March 3, 2017.
17. Bayesian Optimal Experimental Design for ODE/PDE Models I–II, *SIAM Conference on Computational Science and Engineering*, Atlanta, GA, February 27–March 3, 2017.
18. Advances in Computational Solid Earth I–II (Study of Earth's Deep Interior section), *American Geophysical Union Fall Meeting*, San Francisco, CA, December 12–16, 2016.
19. Extreme scale implicit PDE solvers: Parallel algorithms and applications, *SIAM Conference on Parallel Processing for Scientific Computing*, Paris, France, April 2016.
20. Large-scale forward and inverse ice sheet modeling I–II, *SIAM Conference on Computational Science and Engineering*, Salt Lake City, UT, March 2015.
21. Large-scale inverse problems and quantification of uncertainty I-III, *SIAM Conference on Computational Science and Engineering*, Salt Lake City, UT, March 2015.
22. Integrating Big Data and Big Compute for Mechanics Applications, *11th. World Congress on Computational Mechanics (WCCM2014)*, Barcelona, Spain, July 20–25, 2014.
23. Towards Exascale Geophysical Flow Computations, *SIAM Annual Meeting*, Chicago, IL, July 7–11, 2014.
24. Uncertainty Quantification for Ice Sheet Models, *SIAM Conference on Uncertainty Quantification*, Savannah, GA, March 31–April 3, 2014.
25. Stochastic Models, Uncertainty Quantification, and Stochastic Inversion of Large-scale High-dimensional Complex Systems I, II, *SIAM Conference on Uncertainty Quantification*, Savannah, GA, March 31–April 3, 2014.
26. Computational Mechanics in the Big Data and Big Compute World, *12th U.S. National Congress on Computational Mechanics*, Raleigh, NC, July 22–25, 2013.
27. Large-scale full waveform inversion I-III, *SIAM Conference on Computational Science and Engineering*, Boston, MA, February 25–March 1, 2013.
28. Advanced methods for forward and inverse ice sheet modeling, *SIAM Conference on Computational Science and Engineering*, Boston, MA, February 25–March 1, 2013.
29. Uncertainty quantification in ice sheet models, *SIAM Conference on Uncertainty Quantification*, Raleigh, NC, April 2–5, 2012.

30. Large-scale parallel uncertainty quantification: Algorithms and applications, *SIAM Conference on Parallel Processing and Scientific Computing*, Savannah, GA, February 15–17, 2012.
31. Computational Methodologies for Uncertainty Quantification and Stochastic PDE-based Models for Predictive Simulations, *11th U.S. National Congress on Computational Mechanics*, Minneapolis, MN, July 25–29, 2011.
32. Stochastic PDE-based Predictive Simulations using High Performance Computing I–III, *SIAM Conference on Computational Science and Engineering*, Reno, NV, February 28–March 4, 2011.
33. Large-scale optimization in inverse wave propagation I–III, *SIAM Conference on Computational Science and Engineering*, Reno, NV, February 28–March 4, 2011.
34. Challenges in Parallel AMR I-III, *SIAM Conference on Parallel Processing and Scientific Computing*, Seattle, WA, February 24–26, 2010.
35. Data Assimilation and Statistical Inverse Problems I–IV, *SIAM Conference on Computational Science and Engineering*, Miami, FL, March 2–6, 2009.
36. High Performance Computing in Computational Mechanics, *World Congress on Computational Mechanics*, Venice, Italy, June 30–July 4, 2008.
37. Parallel PDE Solvers on Locally Refined Grids, *SIAM Conference on Parallel Processing for Scientific Computing*, Atlanta, GA, March 12–14, 2008.
38. PDE-Constrained Optimization I–VI, *SIAM Conference on Computational Science and Engineering*, Costa Mesa, CA, February 19–23, 2007.
39. Frontiers of Parallel PDE-Constrained Optimization I, II, and III, *12th SIAM Conference on Parallel Processing for Scientific Computing*, San Francisco, CA, February 22–24, 2006.
40. Parallel Mesh Generation I, II, and III, *12th SIAM Conference on Parallel Processing for Scientific Computing*, San Francisco, CA, February 22–24, 2006.
41. Optimization of Systems Governed by PDEs, *Joint Congress of the Austrian and German Mathematical Societies*, Klagenfurt, Austria, September 18–23, 2005.
42. Computational Cardiology I and II, *SIAM Annual Meeting*, New Orleans, LA, July 11–15, 2005.
43. Recent Advances in Seismic Inversion I and II, *Seismological Society of America 2005 Annual Meeting*, Lake Tahoe, NV, April 27–29, 2005.
44. Large-scale PDE-constrained Optimization I, II, and III, *3rd SIAM Conference on Computational Science and Engineering*, Orlando, FL, February 11–15, 2005.
45. Domain Decomposition Methods for PDE-constrained Optimization, *16th International Conference on Domain Decomposition Methods*, Courant Institute, New York University, New York, NY, January 12–15, 2005.
46. Frontiers of Parallel PDE-Constrained Optimization I, II, and III, *11th SIAM Conference on Parallel Processing for Scientific Computing*, February 25–27, 2004.
47. ...and many others prior to 2004.

J. Awards, Prizes, Honors

1. Judge, *Robert J. Melosh Competition for Best Student Paper in Finite Elements*, Duke University, Durham, NC, April 24, 2020.
2. *2019 SIAM Geosciences Career Prize*, for "groundbreaking contributions in analysis, methods, algorithms, and software for grand challenge computational problems in geosciences, and for exceptional influence as mentor, educator, and collaborator."

3. *2019 SIAM SIAG on Computational Science & Engineering Best Paper Prize* (for the period 2015–2018) for the paper *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.* The citation reads: "A cornerstone paper in CS&E that demonstrates a scalable algorithmic framework for geophysical model inversion and uncertainty quantification on extreme-scale ice-sheet modeling exploiting supercomputing architectures."
4. *2018 Lindbergh Lecture*, Department of Mechanical Engineering, University of Wisconsin–Madison.
5. Awarded *2015 ACM Gordon Bell Prize* for the paper: J. Rudi, A.C.I. Malossi, T. Isaac, G. Stadler, M. Gurnis, P.W.J. Staar, Y. Ineichen, C. Bekas, A. Curioni, O. Ghattas, An Extreme-Scale Implicit Solver for Complex PDEs: Highly Heterogeneous Flow in Earth's Mantle, *Proceedings of IEEE/ACM SC15*, 2015.
6. Invited to serve on *National Academies Committee on Models of the World*, 2015–2016.
7. 2014 IEEE/ACM SC14 *Best Poster Award* for the poster *Parallel High-Order Geometric Multigrid Methods on Adaptive Meshes for Highly Heterogeneous Nonlinear Stokes Flow Simulations of Earth's Mantle*, Johann Rudi, Hari Sundar, Tobin Isaac, Georg Stadler, Michael Gurnis, and Omar Ghattas.
8. *SIAM Fellow*, 2014. "For contributions to optimization of systems governed by partial differential equations and leadership to promote computational science and engineering."
9. Selection of the paper "Analysis of the Hessian for inverse scattering problems: I. Inverse shape scattering of acoustic waves" for the 2012 Highlights of the journal *Inverse Problems*.
10. *2012 Joseph C. Walter Excellence Award*, Jackson School of Geosciences.
11. Finalist, *2012 ACM Gordon Bell Prize*, for the paper T. Bui-Thanh, C. Burstedde, O. Ghattas, J. Martin, G. Stadler, and L.C. Wilcox, "Extreme-scale UQ for Bayesian inverse problems governed by PDEs," *Proceedings of ACM/IEEE SC12*, November 2012.
12. *Best Visualization Award* at XSEDE'12 Conference, Chicago, July 16–19, 2012, for animation of global seismic wave propagation (with Greg Abram, Carsten Burstedde, Georg Stadler, and Lucas Wilcox).
13. Invited to serve on the National Research Council of the National Academies *Committee on Mathematical Foundations of Verification, Validation, and Uncertainty Quantification*, 2010–2012.
14. Finalist, *2010 ACM Gordon Bell Prize*, for the paper C. Burstedde, O. Ghattas, M. Gurnis, T. Isaac, G. Stadler, T. Warburton, L.C. Wilcox, "Extreme-Scale AMR," *Proceedings of ACM/IEEE SC10*, November 2010.
15. Research on multiresolution supercomputing models of mantle flow and plate tectonics was featured on the cover of August 27, 2010 issue of *Science*.
16. Judge, *Robert J. Melosh Competition for Best Student Paper in Finite Elements*, Duke University, Durham, NC, April 30, 2010.
17. *SC09 Best Poster Award*, for the poster ALPS: A Framework for Parallel Adaptive PDE Solution, SC09, Portland, OR, November 2009.
18. Selection of the paper "A Newton-CG method for large-scale three-dimensional elastic full-waveform seismic inversion" in the 2008 Highlights of the journal *Inverse Problems*.

19. Finalist, *2008 ACM Gordon Bell Prize* for the paper "Scalable parallel mantle convection simulation on petascale computers," C. Burstedde, O. Ghattas, M. Gurnis, G. Stadler, E. Tan, T. Tu, L. Wilcox, S. Zhong, SC2008, Austin, TX, Nov. 2008.
20. *TeraGrid Capability Computing Challenge Award* for the paper "Towards Adaptive Mesh PDE Simulations on Petascale Computers," C. Burstedde, O. Ghattas, G. Stadler, T. Tu, L. Wilcox, TeraGrid'08, Las Vegas, NV, Jun. 2008.
21. *SC06 HPC Analytics Award*, for the entry: "Remote Runtime Steering of Integrated Terascale Simulation and Visualization," H. Yu, T. Tu, J. Bielak, O. Ghattas, K.-L. Ma, D.R. O'Hallaron, N. Stone, R. Taborda, and J. Urbanic, IEEE/ACM SC06 Conference, Tampa, FL, Nov. 2006. SC06
22. *Finalist, SC06 Best Student Paper Award*, for the paper: T. Tu, H. Yu, and L. Ramirez-Guzman, J. Bielak, O. Ghattas, K.-L. Ma, D.R. O'Hallaron, "From physical models to scientific visualization: An end-to-end approach to parallel supercomputing," *Proceedings of SC06*, Tampa, FL, Nov. 2006.
23. *2004-2005 Carnegie Institute of Technology (CMU's Engineering College) Outstanding Research Award* (with V. Akçelik, J. Bielak, and D. O'Hallaron).
24. Quake Project selected for *Computerworld Honors Permanent Collection*, 2004.
25. Finalist, *2004 Computerworld Honors 21st Century Achievement Awards* (with J. Bielak and D. O'Hallaron; one of five in Science category).
26. Winner, *2003 Gordon Bell Prize for Special Accomplishment* (with CMU Quake group: V. Akcelik, J. Bielak, G. Biros, E. Epanomeritakis, A. Fernandez, E. Kim, D. O'Hallaron, T. Tu, J. Urbanic)
27. Quake Project named a *TeraGrid Flagship Application*, 2003.
28. *Supercomputing 2002 Best Technical Paper Award*, "Parallel Multiscale Gauss-Newton-Krylov Methods for Inverse Wave Propagation," with former students V. Akcelik and G. Biros.
29. Judge, *Robert J. Melosh Competition for Best Student Paper in Finite Elements*, Duke University, Durham, NC, March 29, 2002.
30. *Studies in Computational Tools and Mathematical Modeling for Dynamic Fluid Flows*, AIAA Award for PhD advisee Ivan Malcevic's dissertation, presented at AIAA Aerospace Sciences Conference, Reno, NV, January 2002.
31. Sequenial version of Quake code selected as one of 14 floating point benchmarks in industry-standard *SPEC CPU2000* benchmarks.
32. Parallel versions of Quake code selected for inclusion in the *SPEC OMPM2001* and *OMPL2001* benchmark suites for evaluating shared-memory multiprocessor system performance.
33. *1998 Allen Newell Award for Research Excellence* (with CMU Quake group: H. Bao, J. Bielak, L. Kallivokas, D. O'Hallaron, J. Shewchuk, J. Xu)
34. Finalist, *1997 Gordon Bell Prize* (with CMU Quake group: H. Bao, J. Bielak, L. Kallivokas, D. O'Hallaron, J. Shewchuk, J. Xu)
35. Simulation of 1994 Northridge Earthquake Aftershock selected for *SIGGRAPH 97 Electronic Theater* (with CMU Quake Group)
36. National Science Foundation Research Initiation Grant, 1990.
37. E. Bayard Halsted Scholar, Duke University, 1984–1988.

K. Service on UT Austin Committees

1. Search Committee for Moncrief Endowed Chair in Data Science for CSE (Summer 2020–)
2. Faculty Search Committee in Emerging Areas, Department of Mechanical Engineering (09/19–05/20)
3. Geological Sciences Ad Hoc Promotion and Tenure Review Committee (Spring 2019)
4. TACC Faculty Advisory Board (Fall 2018–)
5. Computational Science, Engineering, and Mathematics Graduate Admissions Committee (Spring 2019)
6. ICES Junior Faculty Search Committee on Foundations of Data Science (Fall 2018–Spring 2019)
7. Computational Materials Modeling Search Committee, Department of Civil, Architectural, and & Environmental Engineering (Fall 2018–Spring 2019)
8. Geological Sciences Ad Hoc Promotion and Tenure Review Committee (Spring 2018)
9. Computational Materials Modeling Search Committee, Department of Civil, Architectural, and & Environmental Engineering (Fall 2017–Spring 2018)
10. Co-Chair, ICES Moncrief Endowed Faculty Search Committee on Mathematical Foundations of Data Science (Spring 2017–Spring 2019)
11. Computational Science, Engineering, and Mathematics Graduate Admissions Committee (2017)
12. Search Committee for Director of ICES (10/16–11/17)
13. Comprehensive Review Committee, Mechanical Engineering Department (2016–2017)
14. Faculty Search Committee in Emerging Areas, Department of Mechanical Engineering (09/16–5/17)
15. Computational Science, Engineering, and Mathematics Graduate Admissions Committee (2016)
16. Geological Sciences Ad Hoc Promotion and Tenure Review Committee (2015)
17. ICES Policy Board (2014–present)
18. Member, Solid Earth Geophysics Search Committee (2014)
19. Search Committee for Executive Director of Texas Advanced Computing Center (3/14–6/14)
20. Chair, ICES Moncrief Endowed Faculty Search Committee in Strategic Opportunity Areas (2014–present)
21. Faculty Search Committee in Emerging Areas, Department of Mechanical Engineering (11/13–5/14)
22. Committee for Faculty Advancement (CFA), Mechanical Engineering Department (1/12–present)
23. Chair, ICES Moncrief Endowed Faculty Search Committee in Computational Geophysical Fluid Dynamics (9/11–3/14)
24. ICES Moncrief Endowed Faculty Search Committee in Uncertainty Quantification (9/11–present)
25. Chair, Jackson School of Geosciences Computational Geosciences Disciplinary Group (2011–2016)
26. ICES Distinguished Research Excellence Awards Committee (4/11–present)
27. ICES Computational Cardiovascular Engineering Faculty Search Committee (4/09–5/11)
28. ICES Computational Statistics Faculty Search Committee (4/09–5/11)

29. Program Faculty Committee, Undergraduate Certificate Program in Computational Science and Engineering (4/09–present)
30. Space and Earth Engineering Strategic Planning Core Team, Cockrell School of Engineering (4/09–12/09)
31. Chair, CAM Software Engineering and High Performance Computing Curriculum Committee (3/09–12/09)
32. ICES Moncrief Chairs Oversight Committee (2/09–present)
33. ICES Moncrief Endowment Oversight Committee (2/09–)
34. Chair, KAUST Computational Earth Sciences Faculty Search Committee (2/08–8/10)
35. Chair, ICES Strategic Planning Committee (2/08–5/09)
36. CAM Graduate Admissions Committee (9/07–4/08)
37. Geological Sciences Exploration Geophysics Faculty Search Committee (9/07–2/08)
38. Computational and Applied Mathematics PhD Program Curriculum Revision Committee (9/07–5/08)
39. College of Science Committee to Review Physics Organized Research Units (7/07–9/07)
40. ICES Succession Plan Committee (5/07–9/07)
41. Geological Sciences Undergraduate Curriculum Review Committee, New Options area (2007)
42. Jackson School of Geosciences, Faculty Search Committee for Crust, Mantle, and Core Dynamics (3/07–8/08)
43. Mechanical Engineering Committee on Intelligent Systems Research Thrust (2/07–8/08)
44. Distinguished Lecture Series on Petascale Simulation, co-chair (9/06–9/09)
45. CAM Graduate Studies Subcommittee (3/06–8/10)
46. CAM Graduate Admissions Committee (9/05–4/06)
47. ICES Advisory Board (9/05–)
48. Jackson School of Geosciences Strategic Planning Committee (9/05–8/09)
49. Geological Sciences Budget Council (9/05–)
50. Geological Sciences Graduate Studies Committee (9/05–)
51. Mechanical Engineering Budget Council (9/05–)
52. Mechanical Engineering Graduate Studies Committee (9/05–)
53. Computational Science, Engineering, and Mathematics (CSEM) Graduate Studies Committee (9/05–)

L. Service on CMU Committees

1. Computer Committee, Department of Civil Engineering (9/89–8/95)
2. Freshman Course Committee, Department of Civil Engineering (8/90–12/90)
3. Faculty Search Committee, Robotics/Civil Engineering (1/90–1/91)
4. CAE Faculty Search Committee, Department of Civil Engineering (12/90–5/91)
5. EPM Faculty Search Committee, Department of Civil Engineering (12/90–5/92)
6. ASCE Student Chapter Faculty Advisor (1/92–5/95)

7. Geoenvironmental Faculty Search Committee, Department of Civil Engineering (9/92–5/93)
8. University Committee on Special Faculty Appointments (9/94–8/97)
9. University Committee on Lecturer Track Appointments (1/95–8/98)
10. Department Head Search Committee, Department of Civil and Environmental Engineering, Fall 1995
11. Computing Strategic Planning Committee, Department of Civil and Environmental Engineering, 9/96–present
12. CAE Faculty Search Committee, Department of Civil and Environmental Engineering (5/98–5/99)
13. Computational Mechanics Faulty Search Committee, Department of Civil and Environmental Engineering (9/98–5/00)
14. Undergraduate Curriculum Committee, Department of Civil and Environmental Engineering (11/99–present)
15. Committee for Promotions and Tenure, College of Engineering (Fall 2001)
16. Faculty Senator (9/01–present)
17. 2002 Faculty Search Committee, Department of Biomedical Engineering
18. 2003 Faculty Search Committee, Department of Biomedical Engineering
19. Committee for Promotions and Tenure, College of Engineering (Fall 2003)
20. Mechanics, Materials, and Computing Faculty Search Committee, Department of Civil and Environmental Engineering (1/04–5/05)
21. Undergraduate Curriculum Committee, Department of Biomedical Engineering, chair (1/04–5/05)
22. Curriculum Review Committee, College of Engineering (1/04–5/05)
23. Curriculum Assessment Committee, College of Engineering (1/04–5/05)

M. Recent Popular Media Stories

1. UT-Austin's Frontera Is The Most Powerful University Supercomputer In The World, Texas Standard, September 9, 2019.
2. April Prize Spotlight: Omar Ghattas and Olav Møyner, SIAM News, March 29, 2019.
3. Students Tackle Bayesian Inverse Problems in the Colorado Rockies: Reflections on the 2018 Gene Golub Summer School, SIAM News, January, 2019.
4. Ghattas Receives 2019 SIAM Geosciences Career Prize, HPCWire, February 12, 2019
5. UT lands coveted $60 million supercomputer, Statesman, Aug 30, 2018
6. $60 million award will bring new supercomputer to UT Austin, KXAN, Aug 29, 2018
7. Stampede 2 drives frontiers of science and engineering forward, NSF press release, June 3, 2016
8. TACC Interview
9. NSF Official On New Supers, Data-Intensive Future, *HPCWire*, March 28, 2013
10. Stampede opens supercomputing gates to research teams, R&D Magazine, March 28, 2013
11. Texas Unleashes Stampede for Science, *TACC Website*, March 27, 2013
12. TACC Unveils Dell HPC System Stampede, *HPCWire*, March 27, 2013

13. Advances in Computational Research Transform Scientific Process and Discovery, *NSF Website*, March 25, 2013
14. New supercomputer is 10,000 times faster than most home networks, *Community Impact Newspaper*, February 28, 2013
15. Stampede supercomputer gives scientists a powerful new tool, *Austin American-Statesman*, November 10, 2012
16. NSF Grant to Build One of World's Top Supercomputers, *Cockrell School of Engineering Website*, October 10, 2011
17. Texas university to build powerful supercomputer, *CNN*, October 6, 2011
18. Stampede's Capabilities Advance Open Resources, *Supercomputing Online*, September 23, 2011.
19. Stampede Charges Computational Science Forward in Tackling Complex Societal Challenges, *NSF Website*, September 22, 2011