Curriculum Vitae Harbir Antil

Personal Data

Address:	Department of Mathematical Sciences George Mason University Fairfax, VA 22030, USA E-Mail: hantil@gmu.edu WWW: http://math.gmu.edu/~hantil
Date of Birth:	August 1983.
Status in USA:	Permanent Resident (Green Card).

Education

2006 - 2009	Ph.D. in Applied Mathematics, University of Houston, Houston, Texas. Advisor: Ronald H.W. Hoppe.
2004 - 2006	MSc. in Applied Mathematics, University of Houston, Houston, Texas
2001 - 2004	BSc. in Physics, St. Stephen's College, Delhi University, India.

Professional Experience

Regular Positions

August 2017 - Current	Associate Professor (with tenure) George Mason University Fairfax, VA.
August 2012 - August 2017	Assistant Professor George Mason University Fairfax, VA.
January 2011 - August 2012	Postdoctoral Researcher at University of Maryland, College Park. Supervisor: Ricardo H. Nochetto.
January - December 2010	Postdoctoral Researcher at Rice University, Houston. Supervisor: Matthias Heinkenschloss, Danny C. Sorensen.
August 2006 - December 2009	Research assistant, University of Houston.
August 2005 - May 2006	Teaching assistant, University of Houston.

Other Recent Positions

March 2019 - Current	Affiliate Associate Professor, Mathematical Sciences, University of Delaware. I can advise PhD students at University of Delaware as the main mentor. Currently advising: Hugo Díaz-Norambuena.
Dec 2016 - Dec 2017	Visiting Faculty, Department of Mathematics, Iowa State University.

Research Stays

June 23 - 28, 2019	Sandia National Laboratories - Albuquerque, NM.
April 25 - 26, 2019	Department of Mathematics, Rutgers University.
March 14 - 15, 2019	Department of Mathematics, NYU.
December 16 - 21, 2018	Department of Mathematics, University of Lisbon, Portugal.
August 23 - 26, 2018	Department of Mathematics, University of Puerto Rico.
July 11 - 14, 2018	Department of Mathematics, University of Freiburg, Germany.
July 7 - 11, 2018	Department of Mathematics, Technical University Munich, Germany.
May 22 - 25, 2018	Department of Mathematics, University of Puerto Rico.
October 16 - 22, 2017	Department of Mathematics, Chiba University, Chiba, Japan.
July 30 - August 12, 2017	Department of Mathematics, Technical University Munich, Germany.
April 12 - 15, 2017	Department of Mathematics, North Carolina State University.
February 21 - 25, 2017	Department of Mathematics, University of Puerto Rico.
January 15 - 22, 2017	Department of Mathematics, University of Marburg, Germany .
December 11 - 17, 2016	Sandia National Laboratories - Albuquerque, NM.
December 7 - 10, 2016	Department of Mathematics, Iowa State University.
October 12 - 14, 2016	Department of Mathematics, University of Connecticut.

October 7 - 9, 2016	Department of Mathematics, University of Freiburg, Germany.
October 2 - 7, 2016	Department of Mathematics, University of Trier, Germany.
April 18 - 22, 2016	Department of Mathematics, University of Tennessee, Knoxville.
April 9-14, 2016	Department of Mathematics, Technical University Munich, Germany.
February 28 - March 5, 2016	Weierstrass Institute, Berlin, Germany.
January 25-28, 2015	Department of Mathematics, Iowa State University, Ames, Iowa.
January 4 - 9, 2016	Department of Mathematics, Santa Maria, Santiago, Chile.
October 28-30, 2015	Department of Mathematics, University of Tennessee, Knoxville.
July 21-31, 2015	Department of Mathematics, Humboldt University, Berlin, Germany.
March 7-14, 2015	Department of Mathematics, Technical University Munich, Germany.
February 11-14, 2015	Department of Mathematics, University of Tennessee, Knoxville.
January 11-14, 2015	Sandia National Laboratories - Livermore, CA.
August 17-21, 2014	Department of Mathematics, University of Tennessee, Knoxville.
June 1-14, 2014	Department of Mathematics, Humboldt University, Berlin, Germany.
January 6-9, 2014	Z-Terra Inc. Houston, Texas.
December 13-20, 2013	Graduate School of Excellence Computational Engineering, Technische Universität Darmstadt, Darmstadt, Germany.
June 18-29, 2012	Department of Mathematics, Humboldt University, Berlin, Germany.
May - June 2008	University of Augsburg, Augsburg, Germany.
June – August 2008	Schlumberger, Sugarland, USA.
May – August 2007	Schlumberger, Sugarland, USA.
May – August 2006	Schlumberger, Sugarland, USA.

Research Interests

(i) optimization algorithms for problems governed by nonlinear, large-scale (infinite dimensional) physical models given by partial differential equations (PDEs); (ii) calculus of variations; (iii) inverse problems; (iv) numerical analysis; (iv) scientific computing and software development; (v) dimensional reduction

Funding:

July 2019 - June 2022	Total amount: $320,000 (GMU share: $100,000) Funding agency: National Science Foundation (DMS-1913004) Project Name: *Collaborative Research: Multilevel Methods for Optimal Control of Partial Differential Equation and Optimization-Based Domain Decomposition.* Single-PI at GMU: **H. Antil**. Other collaborators: Andrei Draganescu, Bedrich Sousedik (UMBC).
April 2019 - March 2020	Total amount: $17,680 Funding agency: National Science Foundation (DMS-1907412) Workshop name: *East Coast Optimization Meeting 2019.* Single-PI: **H. Antil**.
April 4-5, 2019	Total amount: $12,500 Funding agency: Mathematical Sciences ($7.5K) and College of Science ($5K), George Mason University Workshop name: *East Coast Optimization Meeting 2019.* Single-PI: **H. Antil**.

Jan. 2019 - Dec. 2021	Total Amount: $300,000 Funding agency: Air Force Office of Scientific Research (AFOSR) Award NO: FA9550-19-1-0036 Project name: *Structure Exploiting Trust Regions for Bilevel and Risk-Averse Optimization* Single-PI: **H. Antil**
Jan. - May, 2019	Total amount: $22,236 Funding agency: Contract with Sandia National Laboratories, Albuquerque, NM Project name: *Fractional differential operators for features detection in the subsurface* Single-PI: **H. Antil**.
Aug. 2018 - July 2021	Total Amount: $200,000 Funding agency: National Science Foundation (DMS-1818772) Project name: *PDE Constrained Optimization: Algorithms, Numerics, and Applications* Single-PI: **H. Antil**
Jan. - May, 2018	Total amount: $15,472 Funding agency: Contract with Sandia National Laboratories, Albuquerque, NM Single-PI: **H. Antil**.
March 12-16, 2018	Total amount: $6,100 Funding agency: NCM Workshop, Indian Institute of Technology, India Workshop name: *New Directions in PDE Constrained Optimization* co-PIs: **H. Antil**, A. Kumar (Shiv Nadar University, India), N. Nataraj (IIT Bombay, India), T.M. Surowiec (Marburg, Germany).
Aug. 17-19, 2017	Total amount: $5,000 Funding agency: Institute for Mathematics and its Applications (IMA) Workshop name: *Nonlocal School on Fractional Equations - NSFE 2017* co-PIs: **H. Antil**, P.R. Stinga (Iowa State University).
June 6-10, 2016	Total amount: $60,000 Funding agency: NSF and ExxonMobil Research and Engineering Company Workshop name: *Frontiers in PDE Constrained Optimization* co-PIs: **H. Antil**, D. Kouri, D. Ridzal (Sandia National Laboratories), M. Lacasse (ExxonMobil).
June 2015 - May 2019	Total amount: $140,000 Funding agency: National Science Foundation (DMS-1521590), Project name: *Numerical Analysis of PDE Constrained Optimization Problems* Single PI: **H. Antil**
2014–2019	Total amount: $600,000 Funding agency: National Science Foundation (DMS-1407087) Project name: *EXTREEMS-QED: Undergraduate Research in Computational and Data-Enabled Mathematics* PI: M. Emelianenko. co-PI: D. Anderson, **H. Antil**, E. Sander, T. Wanner.

2013–2014 Total amount: $28,079
Funding agency: Deutsche Forschungsgemeinschaft (DFG)
Project name: *International Collaboration Grant: Optimal Control of Electrowetting on Dielectric*
PI: M. Hintermüller, Humboldt University, Berlin, Germany
co-PI: **H. Antil**, R. H. Nochetto, University of Maryland, College Park, USA

Awards and Honors

- **Memember of Scientific and Organizing Committee.** "Sayas Numerics Day" an annual conference in Computational Mathematics.
- **Associate editor** "Mathematical Control and Related Fields" (MCRF)
  January 1, 2019 - December 31, 2022.
  `http://www.aimsciences.org/journals/home.jsp?journalID=23`
- **Affiliate Associate Professor**, Mathematical Sciences, University of Delaware (2019-Current).
- **Semi-plenary speaker** at workshop "Dynamics, Control and Numerics for Fractional PDEs", Puerto Rico, December 5-7, 2018.
- **Plenary speaker** at DFG SPP 1962: Priority Programme on Non-smooth and Complementarity-based Distributed Parameter Systems: Simulation and Hierarchical Optimization. Berlin, Germany. October 1-3, 2018.
- **International external reviewer**. Invited by Central Commission for Academic Evaluation at Universidad Técnica Federico Santa Maria, Chile. 2017.
- **Keynote speaker** RIMS Workshop on Theory of Evolution Equation and Mathematical Analysis of Nonlinear Phenomena. Kyoto University, Japan. October 18-20, 2017.
- **LIGO and Gravitational Waves (GWs).** Our work on Reduced Order Quadrature (`https://arxiv.org/abs/1210.0577`) is playing a crucial role at Advanced LIGO in detecting GWs (`https://arxiv.org/abs/1701.07709`). **The lead LIGO scientists on GWs won 2017 Nobel Prize for Physics.**
- **Winter school teacher and co-organizer** on New Directions in PDE Constrained Optimization. Indian Institute of Technology (IIT), Bombay, India. March 12-18, 2018.
- **Summer school teacher and co-organizer.** Department of Mathematical Sciences, George Mason University, Fairfax, VA. June 28-July 1, 2017. `https://sites.google.com/site/masonmodelingdays/home`
- **Summer school teacher.** Department of Mathematics, Technical University Munich, Germany. July 31-August 4, 2017. `http://www.igdk.eu/IGDK1754/CCAntil2017`
- **Visiting Faculty**. Department of Mathematics, Iowa State University. December 12, 2016 - December 31-2017.
- **US Junior Oberwolfach Fellow**, National Science Foundation travel grant. January 2017. `https://owpdb.mfo.de/detail?photo_id=21483`.
- 2016 **Mason Emerging Researcher/Scholar/Creator award** finalist.
- **Summer school organizer, coordinator and teacher:** Frontiers in PDE Constrained Optimization. IMA, Minneapolis, Minnesota. `http://www.ima.umn.edu/2015-2016/SW6.6-10.16/?event_id=SW6.6-10.16`
- **Keynote speaker** at the SIAM student Chapter, Iowa State University January 27, 2015. `https://www.stuorg.iastate.edu/site/siam-isu/photo-gallery/182/album`

- **Dean's Early-Career Excellence Award**, College of Science at George Mason University 2015. The Early-Career Excellence Award is presented to a tenure-track faculty member.
- **Summer school teacher:** Ciudad Real Numerica 2015. Topic: Numerical Methods for Optimal Control Problems. Ciudad Real, Spain. http://matematicas.uclm.es/crn2015/?language=en
- **Plenary speaker** at Modeling, Analysis and Computing in Nonlinear PDEs. Chateau Liblice, Prague, Czech Republic. September 21-26, 2014. http://www.cs.cas.cz/more2014/
- **Plenary speaker** at Domain Decomposition Methods for Optimization with PDE Constraints. Ascona, Switzerland, September 1-6, 2013. http://www.unige.ch/math/ascona2013/
- **US Junior Oberwolfach Fellow**, National Science Foundation travel grant. November 2012. http://owpdb.mfo.de/detail?photo_id=17252

Publications

Journal Articles in Review ($\star\star$ publications with students and postdocs at GMU)

1. $\star\star$ **H. Antil**, Z. Di, and R. Khatri. Bilevel optimization, deep learning and fractional Laplacian with applications in tomography. Submitted 2019. https://arxiv.org/pdf/1907.09605.pdf
2. Z. Zou, S. Mukherjee, **H. Antil**, and W. Aquino. Adaptive particle-based approximation of the Gibbs posterior for inverse problems. Submitted 2019. https://arxiv.org/pdf/1907.01551.pdf
3. $\star\star$ **H. Antil**, D. Verma, and M. Warma. Optimal control of fractional elliptic PDEs with state constraints and characterization of the dual of fractional order Sobolev spaces. Submitted 2019. https://arxiv.org/pdf/1906.00032.pdf
4. H. Dinh, **H. Antil**, Y. Chen, E. Cherkaev, and A. Narayan. Model reduction for fractional elliptic problems using Kato's formula. 2019. https://arxiv.org/pdf/1904.09332.pdf
5. $\star\star$ **H. Antil**, D. Verma, and M. Warma. External optimal control of fractional parabolic PDEs. 2019. https://arxiv.org/pdf/1904.07123.pdf
6. C.J. Weiss, B.G. van Bloemen Waanders, and **H. Antil**. Fractional Operators Applied to Geophysical Electromagnetics. 2019. https://arxiv.org/pdf/1902.05096.pdf
7. $\star\star$ **H. Antil**, D.P. Kouri, and J. Pfefferer. Fractional Diffusion and uncertainty. 2018
8. **H. Antil**, T. Berry, and J. Harlim. Fractional Diffusion Maps. 2018. https://arxiv.org/pdf/1810.03952.pdf
9. **H. Antil**, Y. Chen, A. Narayan. Certified reduced basis methods for fractional Laplace equations via extension. 2018. https://arxiv.org/pdf/1808.00584.pdf
10. **H. Antil**, T. Brown, and F.J. Sayas. *A problem in control of elastodynamics with piezoelectric effects*. 2018. https://arxiv.org/pdf/1802.06099.pdf

Book

1. H. Antil, D.P. Kouri, M. Lacasse, and D. Ridzal. Frontiers in PDE-constrained Optimization. The IMA Volumes in Mathematics and its Applications 163, Springer. 2018 https://www.springer.com/us/book/9781493986354

Published/Accepted Articles

2. **H. Antil** and C.N. Rautenberg. Sobolev spaces with non-Muckenhoupt weights, fractional elliptic operators, and applications. SIAM Journal on Mathematical Analysis **51**(3), 2479–2503, 2019. https://arxiv.org/pdf/1803.10350.pdf

3. ⋆⋆ **H. Antil**, R. Khatri, and M. Warma. External optimal control of fractional PDEs. Inverse Problems, **35** 084003 (35pp). DOI: https://doi.org/10.1088/1361-6420/ab1299 2019.

4. **H. Antil** and M. Warma. *Optimal control of fractional semilinear PDEs.* ESAIM: Control, Optimisation and Calculus of Variations (ESAIM: COCV). DOI: https://doi.org/10.1051/cocv/2019003 2019.

5. **H. Antil** and M. Warma. *Optimal control of the coefficient for regional fractional p-Laplace equation: Approximation and convergence.* https://arxiv.org/pdf/1612.08201v1.pdf. Mathematical Control & Related Fields, **9**(1), 1–38, 2019.

   The topmost downloaded article two years in a row 2018-19.

6. A. Hazra, V. Maggioni, P. Houser, **H. Antil**, M. Noonan. A monte carlo-based multi-objective optimization approach to merge different precipitation estimates for land surface modeling. Journal of Hydrology, **570**, 2019, pp. 454–462.

7. **H. Antil**, K. Shirakawa, and N. Yamazaki. A class of parabolic systems associated with optimal control of grain boundary motions. Advances in Mathematical Sciences and Applications, **27**(2) 2018, pp. 299–336. https://arxiv.org/pdf/1809.06419.pdf

8. ⋆⋆ **H. Antil**, J. Pfefferer, and S. Rogovs. *Fractional operators with inhomogeneous boundary conditions: analysis, control, and discretization.* https://arxiv.org/pdf/1703.05256.pdf. Communications in Mathematical Sciences (CMS) **16**(5), 1395–1426, 2018.

9. ⋆⋆ **H. Antil**, R. H. Nochetto and P. Venegas. *Controlling the Kelvin force: Basic Strategies and Applications to Magnetic Drug Targeting.* https://arxiv.org/pdf/1704.06872.pdf. Optimization and Engineering, **19**(3), 559–589, 2018.

10. ⋆⋆ **H. Antil**, D. Chen, and S. E. Field. *A Note on QR-Based Model Reduction: Algorithm, Software, and Gravitational Wave Applications.* https://arxiv.org/pdf/1805.06124.pdf. Computing in Science and Engineering **20**(10), 2018.

11. **H. Antil**. *PDE Constrained Optimization (code).* 2018. https://bitbucket.org/harbirantil/pde_constrained_opt

12. ⋆⋆ **H. Antil**, E. Otarola, and A. J. Salgado. *Optimization with respect to order in a fractional diffusion model: analysis, approximation and algorithmic aspects.* http://rdcu.be/J6Hz. Journal of Scientific Computing **77**(1), 204–224, 2018.

13. **H. Antil** and M. Warma. *Optimal control of the coefficient for fractional p-Laplace equation: Approximation and convergence.* RIMS Kôkyûroku, **2090**, 102–116, 2018.

14. **H. Antil** and D. Leykekhman. *A brief introduction to PDE constrained optimization.* Editor. H. Antil and D. P. Kouri and M. D. Lacasse and D. Ridzal. Book title: Frontiers in PDE-Constrained Optimization, Springer. Pages 3–40, 2018.

15. **H. Antil** and C. N. Rautenberg. Fractional elliptic quasi-variational inequalities: theory and numerics. https://arxiv.org/pdf/1712.07001.pdf. Interface and Free Boundaries, **20**(1), 1–24, 2018.

16. ⋆⋆ **H. Antil**, R. H. Nochetto and P. Venegas. *Optimizing the Kelvin Force in a Moving Target Subdomain.* https://arxiv.org/pdf/1612.07763.pdf. Math. Models Methods Appl. Sci. **28**(1), 95–130, 2018.

17. ⋆⋆ **H. Antil**, E. Otárola, and A. J. Salgado. *Some applications of weighted norm inequalities to the error analysis of PDE constrained optimization problems.* DOI: https://doi.org/10.1093/imanum/drx018. IMA Journal of Numerical Analysis, **38**(2), 852–883, 2018.

18. ⋆⋆ **H. Antil**, and E. Otárola. *An a posteriori error analysis for an optimal control problem involving the fractional Laplacian.* DOI: https://doi.org/10.1093/imanum/drx005. IMA Journal of Numerical Analysis, **38**(1), 198–226, 2018.

19. **H. Antil**, and S. W. Walker. *Optimal Control of a Degenerate PDE for Surface Shape.* Appl. Math. Optim. **78** (2), 297–328, 2018.

20. ⋆⋆ **H. Antil** and J. Pfefferer. A short Matlab implementation of fractional Poisson equation with nonzero boundary conditions. Technical report 2017.

    Report: `http://math.gmu.edu/~hantil/Tech_Report/HAntil_JPfefferer_2017a.pdf`

    Code: `https://bitbucket.org/harbirantil/frac_poisson_nhbc/`

21. **H. Antil** and S. Bartels. *Spectral approximation of fractional PDEs in image processing and phase field modeling.* DOI: `https://doi.org/10.1515/cmam-2017-0039`. Computational Methods in Applied Mathematics **17**(4), 2017.

22. ⋆⋆ **H. Antil**, J. Pfefferer, and M. Warma. A note on semilinear fractional elliptic equation: analysis and discretization. DOI: `https://doi.org/10.1051/m2an/2017023`. Math. Model. Numer. Anal. (ESAIM: M2AN) **51**(6), 2017.

23. **H. Antil** and C. N. Rautenberg. A Numerical Method for Fractional Elliptic Quasi-Variational Inequalities. `https://www.mfo.de/document/1704/preliminary_OWR_2017_06.pdf`. Mathematisches Forschungsinstitut Oberwolfach, Report, 2017.

24. **H. Antil**, S. Hardesty, and M. Heinkenschloss. *Shape Optimization of Shell Structure Acoustics.* SIAM J. Control Optim. **55** (3), 1347–1376, 2017.

25. **H. Antil**, S. Hardesty, and M. Heinkenschloss. *Supplementary Materials: Shape Optimization of Shell Structure Acoustics.* 2017. Technical Report: `http://www.caam.rice.edu/~heinken/papers/HAntil_SHardesty_MHeinkenschloss_2016b.pdf`

26. **H. Antil**, M Hintermüller, R. H. Nochetto, T. M. Surowiec and D. Wegner. *Finite Horizon Model Predictive Control of Electrowetting on Dielectric with Pinning.* Interfaces Free Bound. **19** (1), 1–30, 2017.

27. K. Carlberg, M. Barone, and **H. Antil**. *Galerkin v. discrete-optimal projection in nonlinear model reduction.* `http://arxiv.org/pdf/1504.03749v2.pdf`. Journal of Computational Physics, **330**, 693-734, 2017.

28. ⋆⋆ **H. Antil**, E. Otárola, and A. J. Salgado. *A fractional space-time optimal control problem: analysis and discretization.* `http://arxiv.org/pdf/1504.00063v1.pdf`. SIAM Journal of Control and Optimization, 54(3), 1295-1328, 2016.

    Among 10 most read articles of 2016-17.

29. **H. Antil**, and A. J. Salgado. *Approximation of elliptic equations with BMO coefficients.* `http://arxiv.org/pdf/1408.0724v1.pdf`. IMA Journal of Numerical Analysis, 36(1), 222-237, 2016.

30. ⋆⋆ **H. Antil**, R. H. Nochetto, and P. Sodré. *The Stokes problem with Navier slip boundary condition: Minimal fractional Sobolev Regularity of the domain.* `http://arxiv.org/abs/1512.07936v1`. Technical Report. 2015.

31. ⋆⋆ **H. Antil**, and Otárola. *A FEM for an optimal control problem of fractional powers of elliptic operators.* `http://arxiv.org/pdf/1406.7460v3.pdf`. SIAM Journal of Control and Optimization, 53(6), 3432–3456, 2015.

    Among 10 most read articles of 2016-17.

32. ⋆⋆ **H. Antil**, R. H. Nochetto, and P. Sodré. *Optimal Control of a Free Boundary Problem with Surface Tension Effects: A Priori Error Analysis.* `http://arxiv.org/pdf/1402.5709.pdf`. SIAM Journal of Numerical Analysis, **53**(5):2279–2306, 2015.

33. ⋆⋆ **H. Antil**, R. H. Nochetto, and P. Sodré. *Optimal Control of a Free Boundary Problem: Analysis with Second Order Sufficient Conditions.* `http://arxiv.org/pdf/1210.0031v1.pdf`. SIAM Journal of Control and Optimization, **52**(5):2771–2799, 2014.

34. **H. Antil**, M. Heinkenschloss, and D. C. Sorensen. *Application of Discrete Empirical Interpolation Method to Reduced Order Modeling of Nonlinear and Parametric Systems.* A. Quarteroni and G. Rozzas (eds.), Reduced Order Methods for Modeling and Computational Reduction, Model. Simul.& Appl. Vol. 9, 2014, pp. 101-136, Springer Italia, Milan.

35. **H. Antil**, S. Field, F. Herrmann, R. H. Nochetto, and M. Tiglio. *Two-step Greedy Algorithm for Reduced Order Quadratures (ROQ).* `http://arxiv.org/pdf/1210.0577v2.pdf`. Journal of Scientific Computing, Springer, **57**:604–637, 2013.

    - **ROQ is now part of LIGO analysis code** `https://www.lsc-group.phys.uwm.edu/daswg/docs/howto/lal-install.html`
    - **ROQ is now part of** FINESSE **software package used at LIGO** `http://arxiv.org/abs/1507.03806`.

36. **H. Antil**. *Optimal Control of a Free Boundary Problem with Surface Tension Effects.* Mathematisches Forschungsinstitut Oberwolfach, Report No. 57/2012, DOI: 10.4171/OWR/2012/57. `http://www.mfo.de/occasion/1248c/www_view`

37. **H. Antil**, M. Heinkenschloss, R.H.W. Hoppe, C. Linsenmann, and A. Wixforth. *Reduced Order Modeling Based Shape Optimization of Surface Acoustic Wave Driven Microfluidic Biochips.* Mathematics and Computers in Simulation, **82**:1986-2003, 2012.

38. **H. Antil**, R.H.W. Hoppe, C. Linsenmann, and A. Wixforth. *Multiscale Aspects in Modeling and Simulation of Surface Acoustic Wave Driven Microfluidic Biochips.* E-Book Series: Progress in Computational Physics (PiCP), Volume 2, Bentham Science Publishers, 2011.

39. **H. Antil**, M. Heinkenschloss, and R.H.W. Hoppe. *Domain Decomposition and Balanced Truncation Model Reduction for Shape Optimization of the Stokes System.* Optimization Methods and Software, **26**:643-669, 2011.

    Most cited article in this journal. Years 2012-13.

40. **H. Antil**, M. Heinkenschloss, R.H.W. Hoppe, and D.C. Sorensen. *Domain Decomposition and Model Reduction for the Numerical Solution of PDE Constrained Optimization Problems with Localized Optimization Variables.* Computing and Visualization in Science, **13**(6):249-264, 2010.

41. **H. Antil**, R. Glowinski, R.H.W. Hoppe, C. Linsenmann, T.-W. Pan, and A. Wixforth. *Modeling, Simulation, and Optimization of Surface Acoustic Wave Driven Microfluidic Biochips.* `http://math.gmu.edu/~hantil/preprints/HAntil_RGlowinski_RHoppe_2010.pdf`. Journal of Computational Mathematics, **28**(2):149-169, 2010.

42. **H. Antil**. *Shape Optimization Governed by the Heat and the Stokes Equations Using Domain Decomposition and Model Reduction.* Mathematisches Forschungsinstitut Oberwolfach, Report No. 04/2009, DOI: 10.4171/OWR/2009/04. `http://www.mfo.de/occasion/0905/www_view`

43. **H. Antil**, R.H.W. Hoppe, and C. Linsenmann. *Adaptive Multilevel Interior Point Methods in PDE Constrained Optimization.* Proc. Int. Conf. on Domain Decomposition Methods and Applications XVIII (Bercovier, M. et al.; eds.), Lecture Notes in Computational Science and Engineering, **70**:15–26, Springer, Berlin Heidelberg-New York, 2009.

44. **H. Antil**, R.H.W. Hoppe, and C. Linsenmann. *Optimal Design of Stationary Flow Problems by Path-following Interior Point Methods.* Control and Cybernetics, **37**(4):771–796, 2008.

45. **H. Antil**, R.H.W. Hoppe, and C. Linsenmann. *Adaptive Path-following Primal-Dual Interior Point Methods for Shape Optimization of Linear and Nonlinear Stokes Flow Problems.* Lecture Notes in Computer Science, **4818**:259-266, Springer, Berlin-Heidelberg-New York, 2008.

46. **H. Antil**, A. Gantner, R.H.W. Hoppe, D. Köster, K.G. Siebert and A. Wixforth. *Modeling and Simulation of Piezoelectrically Agitated Acoustic Streaming on Microfluidic Biochips.* Proc. Int. Conf. on Domain Decomposition Methods and Applications XVII (Langer, U. et al.; eds.), Lecture Notes in Computational Science and Engineering, **60**:305–312, Springer, Berlin Heidelberg-New York, 2008.

47. **H. Antil**, R.H.W. Hoppe, and C. Linsenmann. *Path-following Primal-Dual Interior Point Methods for Shape Optimization of Stationary Flow Problems.* Journal of Numerical Mathematics, **15**(2):81–100, 2007.

Others

48. **H. Antil**. *Optimization and Model Reduction of Time Dependent PDE-Constrained Optimization Problems: Applications to Acoustic Wave Driven Microfluidic Biochips.* PhD Dissertation, Department of Mathematics, University of Houston, 2009. `http://search.proquest.com/docview/250928958`

Software

1. **PDE Constrained Optimization.** 2018

   Code: `https://bitbucket.org/harbirantil/pde_constrained_opt`

2. **Fractional PDEs with nonzero boundary conditions.**

   Report: `http://math.gmu.edu/~hantil/Tech_Report/HAntil_JPfefferer_2017a.pdf`

   Code: `https://bitbucket.org/harbirantil/frac_poisson_nhbc/`

   Please cite the code as:

   - **H. Antil** and J. Pfefferer. A short Matlab implementation of fractional Poisson equation with nonzero boundary conditions. Technical Report. George Mason University. 2017.

3. **Greedycpp** - A fast, scalable and easy-to-use parallelization of the greedy algorithm for building application-specific basis, empirical interpolants and reduced order quadrature rules. Features include (i) Easy to interface with existing models, (ii) validate the approximation quality, (iii) find the empirical interpolation points using a fast algorithm (iv) parallelized for shared and distributed memory environments. `https://bitbucket.org/sfield83/greedycpp/`

   Please cite the code as:

   - ⋆⋆ **H. Antil**, D. Chen, and S. E. Field. *A Note on QR-Based Model Reduction: Algorithm, Software, and Gravitational Wave Applications.* `https://arxiv.org/pdf/1805.06124.pdf`. Computing in Science and Engineering **20**(10), 2018.

Professional Services

Conferences, Minisymposia and Seminars Organized

Major conference organizer

1. **Memember of Scientific and Organizing Committee.** "Sayas Numerics Day" an annual conference in Computational Mathematics.

2. **Annual East Coast Optimization Meeting (ECOM) organizer and chair**
   First workshop: April 4-5, 2019
   George Mason University, Fairfax, VA
   Co-organized with Drew Kouri and Denis Ridzal (Sandia National Laboratories) `http://math.gmu.edu/~hantil/ECOM/2019/`
   The workshop had 75 registered participants from all over the country. We hosted tutorials two for students and early career researchers (6 hours total). There were 4 invited talks and 19 contributed talks.

3. **Winter school/workshop organizer and chair:** New Directions in PDE Constrained Optimization. Indian Institute of Technology, Bombay, India. March 12-16, 2018.
   Co-organized with A. Kumar (Shiv Nadar University, India), N. Nataraj (IIT Bombay) and T.M. Surowiec (Marburg, Germany).
   `https://www.atmschools.org/2018/atmw/ndpco/speakers-and-syllabus`

4. **Mason Modeling Days** (member of organizing committee)
   George Mason University, Fairfax, VA. June 28-July 1, 2017.
   `https://sites.google.com/site/masonmodelingdays/home`

   I along with G. Dogan (NIST) supervised 9 students. Their task was to use fractional models to do image-denoising.

5. **Summer school/Workshop organizer:** Nonlocal School on Fractional Equations - NSFE 2017.
   Iowa State University, Ames, IA. August 17-19, 2017.
   Co-organizers: Paul Sacks (Iowa State), Pablo Stinga (Iowa State).
   `http://www.public.iastate.edu/~stinga/NSFE2017`

   We hosted tutorials two for students and early career researchers (6 hours total). The tutorials were given by L. Caffarelli (UT Austin) and R.H.Nochetto (Univ. of Maryland). There were a total of 6 invited talks. Total attendees: 65 (38 students).

6. **Conference organizer:** Frontiers in PDE Constrained Optimization
   IMA, Minneapolis June 6-10, 2016.
   Co-organized with D. Kouri, D. Ridzal (Sandia National Laboratories), M. Lacasse (ExxonMobil).
   `https://www.ima.umn.edu/2015-2016/SW6.6-10.16/?event_id=SW6.6-10.16`

   We hosted tutorials for students and early career researchers on the first two days. I gave the first tutorial on PDE constrained optimization and I was also the tutorial co-ordinator. The last three days were reserved for the workshop which was attended by academia, industry and funding agencies. The entire conference was fully funded by ExxonMobil and IMA (NSF). Total attendees: 60.

7. **Conference organizer and chair** Spring 2016 Delaware Maryland Numerics Day (DelMar).
   `http://delmar.math.umd.edu/`
   Co-organized with Maria Emelianenko and Padmanabhan Seshaiyer.

   We hosted DelMar which is a day (annual) meeting at GMU. There were 13 contributed talks and 1 plenary talk. Total attendees: 45.

8. **Conference Organizer and chair** of Spring 2015 Finite Element Circus, George Mason University.
   `https://sites.google.com/site/finiteelementcircus/`

   I single-handedly organized the biannual finite element conference at GMU. There were more than 25 talks and it was a two day day event. Total attendees: 80.

9. **Conference organizer:** Workshop on Advances in Numerical Analysis and Scientific Computing.
   On Occasion of the 60th Anniversary of Ronald H.W. Hoppe. April 15-16, 2011. `http://www.math.uh.edu/~pan/Hoppe/`
   Co-organized with Y. Kuznetsov, J. Morgan, T. W. Pan (University of Houston).

Minisymposium organizer at major conferences

10. **Minisymposium organizer:** Optimization with PDE Constraints: Analysis and Numerics.
    SIAM Conference on Analysis of Partial Differential Equations, La Qunita, CA. December 11-14, 2019.
    Co-organized with Dmitriy Leykekhmaman (University of Connecticut).
    Total 5 speakers.

11. **Minisymposium organizer:**
The Sixth International Conference on Continuous Optimization (ICCOPT). Berlin, Germany. August 5-8, 2019.
Co-organized with Carlos Rautenberg (Humboldt University) and Mahamadi Warma (University of Puerto Rico).
Total 6 speakers.

12. **Minisymposium organizer:** PDE-constrained optimization under uncertainty.
The Sixth International Conference on Continuous Optimization (ICCOPT). Berlin, Germany. August 5-8, 2019.
Co-organized with Drew P. Kouri (Sandia National Labs) and Thomas Surowiec (Marburg, Germany), Stepan Ulbrich (Darmstadt), Michael Ulbrich (TU Munich).
Total 9 speakers.

13. **Minisymposium organizer:** Methods for Large-Scale Risk-Averse Optimization.
SIAM Conference on Computational Science and Engineering (CSE19), Spokane, Washington, USA. February 25-March 1, 2019.
Co-organized with Drew Kouri (Sandia National Laboratories)
Total 8 speakers

14. **Minisymposium organizer:** Risk-Averse PDE-Constrained Optimization–Methods and Applications.
23rd International Symposium on Mathematical Programming (ISMP) July 1-6, 2018 in Bordeaux.
Co-organized with Drew Kouri (Sandia National Laboratories)
Total 8 speakers.

15. **Minisymposium organizer:** Advances in reconstruction algorithms for computed tomography.
SIAM Conference on Imaging Science (IS18), 5-8 June 2018
Co-organized with Gunay Dogan (NIST).
4 sessions (total 16 speakers)

16. **Minisymposium organizer:** Exploiting structure in optimization under uncertainty
SIAM Conference on Uncertainty Quantification (UQ18). April 16-19, 2018.
Co-organized with D. Kouri, D. Ridzal (Sandia National Laboratories), Thomas Surowiec (Marburg, Germany).
2 sessions (total 8 speakers)

17. **Minisymposium organizer:** Mathematical advances in hydrology: non-stationarity and data assimilation
SIAM Conference on Mathematics of Planet Earth Philadelphia (PA) – September 30-October 2, 2016
Co-organized with Maria Emelianenko (Mathematics, GMU), Paul Houser (Geography and Geoinformation Science, GMU), Viviana Maggioni (Environmental and Water Resources Engineering, GMU), Tim Sauer (Mathematics, GMU).

18. **Minisymposium organizer:** Numerical Methods for Non-local Problems.
Conference: Fifth Chilean Workshop on Numerical Analysis of Partial Differential Equations. January 11 - 15, 2016. Concepcion, Chile. `http://www.ci2ma.udec.cl/wonapde2016/`
Co-organized with E. Otárola (Santa Maria), A. J. Salgado (University of Tennessee).

19. **Minisymposium organizer:** Advances in Numerical Methods for PDEs with Applications.
Conference: SIAM PDE. December 7–10, 2015. Arizona, USA. `http://www.siam.org/meetings/pd15/`
Co-organized with Lise-Marie Imbert–Gerard (Courant Institute, NYU).

20. **Minisymposium organizer:** Shape Optimization and Optimal Control for PDE Constrained Optimization Problems.
Conference: Domain Decomposition Methods for Optimization with PDE Constraints. September 1–6, 2013. Ascona, Switzerland. `http://www.unige.ch/math/ascona2013/`
Co-organized with M. Heinkenschloss (Rice University), R. H.W. Hoppe (University of Houston).

21. **Minisymposium organizer:** Model Reduction for Nonlinear Problems and PDE Constrained Optimization.
    Conference: Fourth Chilean Workshop on Numerical Analysis of Partial Differential Equations. January 14 - 18, 2013. Concepcion, Chile. `http://www.ci2ma.udec.cl/wonapde2013/`
    Co-organized with R. H. Nochetto (University of Maryland), Y. Maday (Paris).

Seminar organizer at GMU

22. **Organizer and chair.** Satellite Image Analysis via Deep Learning, George Mason University, Fall 2019.

23. **Organizer and chair.** Satellite Image Analysis via Deep Learning, George Mason University, Spring 2019.
    The seminar is regularly attended by over 40 participants.

24. **Organizer and chair** PDE Control Seminar, George Mason University, every semester since Fall 2013.

25. **Lead co-organizer** of Applied and Computational Math Seminar, George Mason University, since Spring 2014 with D. Anderson and I. Griva.

Visitors hosted at GMU. On average I have hosted 10 visiting scholars per year at GMU (15 visitors in 2018) during last 6 years. These visitors give talks in our Applied Math Seminar where I am currently the lead organizer.

Associate editor
"Mathematical Control and Related Fields" (MCRF)
January 1, 2019 - December 31, 2022.
`http://www.aimsciences.org/journals/home.jsp?journalID=23`

Reviewer for Journals (10-15 papers per year on average)

Journal de Mathématiques Pures et Appliquées – Mathematics of Computation – Archive for Rational Mechanics and Analysis – SIAM Journal of Optimization – SIAM Journal of Control and Optimization – IMA Journal of Numerical Analysis – Numerische Mathematik – SIAM Journal of Scientific Computing – Journal of Optimization Theory and Applications – Journal of Scientific Computing – Journal of Mathematical Analysis and Applications – Advances in Computational Mathematics – Journal of Computational and Applied Mathematics – Computers & Fluids – Journal of Optics – Computational Optimization and Applications – IEEE Control Systems Society Conference Management System – IMA Journal of Mathematical Control and Information – Mathematical Reviews/MathSciNet Reviewer – zbMATH – Calcolo (CALC) – Optimization Methods and Software – Inverse Problems.

Book Reviews

Chapman & Hall/CRC - 2019.

National Panel participation
Department of Energy Early Career (panel) (2019)
Department of Energy Early Career (mail in review) (2019)
Department of Energy Early Career (mail in review) (2018)
National Science Foundation (panel) (2016)
Department of Energy Early Career (mail in review) (2016)

International Panel participation
Chilean National Foundation (2017)
Indo-U.S. Science & Technology Forum (IUSSTF) – 2018

International external reviewer.
Invited by Central Commission for Academic Evaluation at Universidad Técnica Federico Santa Maria, Chile. 2017.

Membership in Professional Societies

Society for Industrial and Applied Mathematics (SIAM).
Mathematical Optimization Society (MOS).

(Multi-)University Level Committee

March 2019 - Current: Coordinator of Academic Cooperation between George Mason University and Indian Institute of Technology (IIT) Bombay, India. We have established a MOU to help recruit graduate students and to encourage exchange of students and faculty. Already one student is here from IIT Bombay.

University Level Committee

Department of Mathematical Sciences Chair search committee 2017.
Nomination and Membership Committee. (two years) 2014-15.
Academic Program Review Committee. (three years) 2013-16.

Department Level Committee

Hiring Committee (Chair) 2018-19 (hired two faculty memembers)
Committee for Reappointment of Department Chair - D. Walnut.
Graduate Committee (April 2018 - current)

Qualifying Exam Committee

Numerical analysis qualifying exam committee. George Mason University. Fall 2013 (chair), Spring 2014 (chair), Fall 2014, Spring 2015, Fall 2015, Fall 2018 (Chair), Spring 2019.

Reading Courses at George Mason University

Deepanshu Verma (Spring 2019)	Nonsmooth optimization.
Deepanshu Verma (Fall 2018)	Topics in Nonsmooth Optimization.
Sayomi Stallings (Fall 2017)	Measure theory and functional analysis
Ratna Khatri (Fall 2017)	PDE Constrained Optimization.
Mahendra Panagoda (Spring 2015)	PDE Control.
Mahendra Panagoda (Fall 2014)	Nonlinear Optimization.
Diego Torrejon (Summer 2014)	Numerical Analysis.
Mahendra Panagoda (Summer 2014)	Complex Fluids.
Mahendra Panagoda (Spring 2014)	Nonlinear Analysis.
Diego Torrejon (Fall 2013)	PDE Constrained Optimization.

Teaching Experience

George Mason University

Fall 2019	Math 678 - Partial Differential Equations
Fall 2019	Math 493 - Deep Learning (**new special topics class**)
Spring 2019	Math 689 - Deep Learning and Optimization Under Uncertainity (**new special topics class**)
Spring 2019	PDE-Control Seminar - Numerical Methods for PDEs
Fall 2018	Math 689 - Deep Learning and PDE-Constrained Optimization (**new special topics class**)
Fall 2018	PDE-Control Seminar on Nonlinear Programming
Spring 2018	Math 685 - Numerical Analysis
Spring 2018	PDE-Control Seminar on Optimization with PDE Constraints - I
Fall 2017	Math 678 - Partial Differential Equations
Fall 2017	PDE-Control Seminar on Uncertainity Quantification

Spring 2017	Math 689 - Calculus of Variations (**special topics class**)
Spring 2017	PDE-Control Seminar Fractional PDEs
Fall 2016	Math 689 - Adaptive Finite Element Methods (**new special topics class**)
Fall 2016	PDE-Control Seminar Γ-convergence
Fall 2015	Math 678 - Partial Differential Equations
Fall 2015	Math 113 - Analytic Geometry and Calculus I
Fall 2015	PDE-Control Seminar on Optimization with PDE Constraints - II
Spring 2015	Math 689 - Calculus of Variations (**new special topics class**)
Spring 2015	PDE-Control Seminar on Optimization with PDE Constraints - I
Fall 2014	Math 113 - Analytic Geometry and Calculus I
Fall 2014	PDE-Control Seminar on Optimization in Finite diamensions
Spring 2014	Math 689 - Finite Element Methods for PDE (**new special topics class**).
Spring 2014	PDE-Control Seminar on Finite Element Methods
Fall 2013	Math 413 (Modern Applied Math I)
Fall 2013	PDE-Control Seminar on Optimization with PDEs
Spring 2013	Math 685 (Numerical Methods)
Fall 2012	Math 315 (Advanced Calculus)

University of Maryland, College Park

Spring 2012	Math 401 (Applications of Linear Algebra).
Fall 2011	Math 241H (Calculus III), Honors section.
Spring 2011	Math 310 - Introduction to Analysis.

Students and PostDocs

PhD Students

Ratna Khatri	Current (PhD, expected August 2020) at George Mason University.
Deepanshu Verma	Current (PhD) at George Mason University.
Kiefer Green	Current (PhD) at George Mason University.
Mahendra Panagoda	Current (PhD) at George Mason University, jointly with Tyrus Berry.
Hugo Díaz-Norambuena	Current (PhD) at University of Delaware.
Patrick Sodré	Department of Mathematics, University of Maryland, (with Ricardo H. Nochetto). *Thesis:* Optimal control for free boundary problems. Jan 2010-Aug 2012. *First Position:* Senior Research Scientist at Intelligent Automation, Inc.

MS Students

Dennis Marti	MS-Math (Spring 2019) *First Position:* Verizon
Justin Thorpe	MS-Math (Spring 2018) *First Job:* PhD student Department of Mathematical Sciences, George Mason University.
Tuan Le	MS-Math (Fall 2017) *First Job:* PhD student at Systems Engineering and Operations Research, George Mason University.

Other Ph.D. students

Tianyi Shi	Math PhD student at Cornell. Summer 2019 at GMU with H. Antil

PostDocs

Thomas Brown	May 2019 - Current.
Johannes Pfefferer	George Mason University (October 2015 - December 2015). *First job:* PostDoc Technical University, Munich, Germany.
Pablo Venegas	George Mason University (August 2015 - December 2015). *First job:* Professor, Universidad del Bio-Bio, Concepcion, Chile.
Enrique Otárola	George Mason University (August 2014 - June 2015). *First job:* Professor, Santa Maria, Santiago, Chile.

Undergraduate

Brendan Gramp	Extreems, George Mason University (current) *First job:* Math PhD student at University of Maryland, College Park.
Lucas C. Bouck	Extreems, George Mason University (December 2015 - May 2018). **2018 NSF GRFP Fellow** (most prestigious NSF Graduate Fellowship) **2017 Goldwater Honorable Mentions** *First job:* Math PhD student at University of Maryland, College Park.
Mae Markowski	Extreems, George Mason University (May 2015 - current). *First job:* Applied Math PhD student at Rice University. **Honorable mention in NSF-GRFP** (most prestigious NSF Graduate Fellowship)
Dangxing Chen	REU Summer 2013, George Mason University. *First job:* Math PhD student at University of North Carolina at Chapel Hill.
Alexander Goldstone	URCM 2013-14, George Mason University. *First job:* PhD student at George Mason University.

PhD Dissertation Committee

Current

Jeff Snider, George Mason University, Fairfax.
Stephen Wheatley, George Mason University, Fairfax.

Past.

Diego Torrejon, George Mason University, Fairfax.
Sergejs Rogovs, University of Bundeswehr Munich, Germany.
James Cameron, George Mason University, Fairfax.
Mona Hajghassem, University of Maryland, Baltimore County.
Patrick Sodré, University of Maryland, College Park.
Patrick O'Neil, George Mason University, Fairfax.
Jyoti Saraswat, University of Maryland, Baltimore County.
Maziar Raissi, George Mason University, Fairfax.

Research Talks

2019

1. Invited speaker at Workshop on "Optimization and Inversion under Uncertainty", November 11-15, 2019, Radon Institute for Computational and Applied Mathematics (RICAM), Linz, Austria.

2. Invited speaker at Workshop on "Optimal Control and Optimization for Nonlocal Models", October 28-30, 2019, Radon Institute for Computational and Applied Mathematics (RICAM), Linz, Austria.

3. Analysis seminar at Department of Mathematics, University of Pittsburgh. October 3, 2019.

4. Colloquium, Department of Mathematical Sciences, George Mason University. Fairfax, VA. September 20, 2019.

5. Invited talk at Air Force Office of Scientific Research annual meeting of Optimization program. August 22-23, 2019.

6. Minisymposium speaker. The Sixth International Conference on Continuous Optimization (ICCOPT). Berlin, Germany. August 5-8, 2019.

7. Colloqium speaker at BlackSky, Virginia. May 10, 2019.

8. Applied and Computational Math Seminar speaker. Rutgers University. April 26, 2019.

9. Numerical Analysis and Scientific Computing Seminar. Courant Institute, New York University (NYU). March 15, 2019.

10. Minisymposium speaker: Recent Advances in PDE-constrained Optimization under Uncertainty. SIAM CS & E. February 25 - March 1, 2019. Spokane, Washington.

11. Minisymposium speaker: Methods for Large-Scale Risk-Averse Optimization. SIAM CS & E. February 25 - March 1, 2019. Spokane, Washington.

12. Invited speaker at Francisco Javier-Sayas Fest at University of Delaware. February 16, 2018.

2018

13. Analysis and Differential Equations Colloquium speaker. University of Lisbon, Portugal, December 20, 2018.

14. 2018 American Geophysical Union meeting Washington D.C. 10-14 Dec 2018.

15. Semi-plenary Speaker at "Dynamics, Control and Numerics for Fractional PDEs", Puerto Rico, December 5-7, 2018.

16. Applied and Computational Math Seminar speaker at George Mason University, Fairfax, VA. November 16, 2018.

17. Finite Element Circus. Department of Mathematics, University of Delaware. November 9-10, 2018.

18. Speaker at Applied Interdisciplinary Mathematics (AIM) graduate student seminar. University of Michigan, Ann Arbor. October 26, 2018.

19. Speaker at Applied Interdisciplinary Mathematics (AIM) Seminar. University of Michigan, Ann Arbor. October 26, 2018.

20. SIAM Faculty Symposium, George Mason University, Fairfax VA. October 12, 2018.

21. Minisymposium speaker "Numerical approximation of fractional differential equations" at SIAM Texas-Louisiana Section, Louisiana State University, October 5-7, 2018.

22. Minisymposium speaker "Numerical Geometric PDE" at SIAM Texas-Louisiana Section, Louisiana State University, October 5-7, 2018.

23. **Plenary speaker** at DFG SPP 1962: Priority Programme on Non-smooth and Complementarity-based Distributed Parameter Systems: Simulation and Hierarchical Optimization. Berlin, Germany. October 1-3, 2018.

24. Speaker at COS-VSE lunch seminar. George Mason University. September 20, 2018.

25. Colloquium at United States Naval Academy, Annapolis, Maryland. September 14, 2018.

26. Applied Numerical Analysis Seminar speaker at Department of Mathematics, Virginia Tech. September 19, 2018.

27. Continuum Mechanics Seminar speaker at University of Nebraska-Lincoln. September 6, 2018.

28. Invited speaker at AFOSR Optimization and Discrete Math Program Review. Arlington, VA. August 23-24, 2018.

29. Colloquium at Naval Research Lab, Washington D.C. July 25, 2018.

30. Colloquium at Department of Mathematics, University of Freiburg. Freiburg, Germany. July 13, 2018.

31. Colloquium at Department of Mathematics, Technical University Munich, Germany. July 9, 2018.

32. Minisymposium speaker at The International Symposium on Optimization (ISMP) 2018. July 1-6, 2018, Bordeaux, France.

33. Minisymposium speaker at SIAM Conference on Imaging Science. June 5-8, 2018. Bologna, Italy.

34. Minisymposium speaker at SIAM Conference on Uncertainty Quantification. April 16-19, 2018. Garden Grove, California.

35. **Winter school organizer and teacher**. IIT Bombay, India. March 12-16, 2018.

36. COS-VSE Seminar Series speaker. George Mason University. March 23, 2018.

37. PDE and Topology Seminar speaker, University of Connecticut. February 05, 2018.

38. Applied and Computational Math Seminar speaker. George Mason University, February 02, 2018.

39. Computational and Applied Mathematics Colloquium. Penn State University. 08 Jan 2018.

40. Graduate student seminar. Penn State University. 08 Jan 2018.

2017

41. Invited speaker at workshop Modeling, Analysis and Numerics for Nonlocal Applications (MANNA). Santa Fe, NM Dec 11-15, 2017.

42. Invited speaker (software session) at workshop Modeling, Analysis and Numerics for Nonlocal Applications (MANNA). Santa Fe, NM Dec 11-15, 2017.

43. Numerical Analysis and PDE Seminar speaker, University of Delaware, December 7, 2017.

44. Applied and Computational Math Seminar. Rutgers University. December 1, 2017.

45. Colloquium speaker. Department of Mathematics, University of Nebraska-Lincoln, Lincoln, NE 68588. November 3, 2017.

46. Mechanics seminar speaker. Department of Mathematics, University of Nebraska-Lincoln, Lincoln, NE 68588. November 1, 2017.

47. **Keynote Speaker**. RIMS conference on Theory of Evolution Equations and Mathematical Analysis of Nonlinear Phenomena. Kyoto, Japan, October 18-20, 2017.

48. Mechanical Engineering and Materials Science (MEMS) Seminar Duke University. October 11, 2017.

49. **Summer school teacher.** Department of Mathematics, Technical University Munich, Germany. July 31-August 4, 2017. `http://www.igdk.eu/IGDK1754/CCAntil2017`

50. Minisymposium speaker: Mathematical Congress of Americas, Montreal, Canada. July 24-28, 2017.

51. Minisymposium speaker: Optimal control of fractional PDEs. SIAM Control and Optimization. July 10-12, 2017. Pittsburgh.

52. **Summer school teacher.** Mason Modeling Days, George Mason University, Fairfax, VA. June 28-July 1, 2017.

53. Minisymposium speaker: Optimization with PDEs: Theory and Numerics, SIAM Optimization. Vancouver, Canada. May 22-25, 2017.

54. Scientific Computing Seminar at Division of Applied Mathematics, Brown University. May 12, 2017.

55. Applied and Computational Math Seminar. George Mason University, Fairfax, VA. April 28, 2017.

56. Finite Element Circus. Rutgers University. April 21-22, 2017.

57. Minisymposium speaker: SIAM-SEAS, Florida State University, March 18-19, 2017.

58. Minisymposium speaker: Free-boundary Fluid Models and Related Problems. AMS Spring Southeastern Section Meeting. College of Charleston. Charleston, SC, March 10-12, 2017.

59. Minisymposium speaker: Recent Trends in Finite Element Methods. AMS Spring Southeastern Section Meeting. College of Charleston. Charleston, SC, March 10-12, 2017.

60. Minisymposium speaker: Stochastic PDE-Constrained Optimization and Applications. SIAM CS & E. February 27 - March 3, 2017. Atlanta, Georgia.

61. Differential equations seminar speaker, Department of Mathematics, North Carolina State University. April 12, 2017.

62. Invited speaker Emerging Developments in Interfaces and Free Boundaries. Mathematisches Forschungsinstitut Oberwolfach, January 22-28, 2017.

63. Colloquium speaker, Department of Mathematics, University of Marburg, Marburg, Germany. January 18, 2017.

2016

64. Numerical Analysis and PDE Seminar speaker, University of Delaware, December 1, 2016.

65. Minisymposium speaker: Control, Optimization, and Differential Games. North Carolina State University, Raleigh, NC. November 12-13, 2016.

66. Finite Element Circus, Worcester Polytechnic Institute, October 14-15, 2016.

67. Invited talk at workshop on Simulation and Optimization of Extreme Fluids. Heidelberg University, Germany. October 10-12, 2016.

68. Algorithmic Optimization (ALOP) Colloquium, Department of Mathematics, University of Trier. Trier, Germany. October 5, 2016.

69. Minisymposium speaker. SIAM Conference on Mathematics for Planet Earth. Philadelphia, Pennsylvania, USA. September 30 - October 2, 2016.

70. Minisymposium speaker. The Fifth International Conference on Continuous Optimization (ICCOPT). Tokyo, Japan. August 8-11, 2016.

71. Minisymposium speaker. Recent Advances in Finite Element Methods for Nonlinear PDEs. SIAM Annual Meeting, Boston. July 11-14, 2016.

72. Tutorial speaker. Frontiers in PDE constrained optimization. IMA, Minneapolis. June 6-10, 2016.

73. Invited speaker at DelMar Numerics Day, Annual Workshop on Computational Mathematics, George Mason University, Fairfax, VA, May 14, 2015.

74. Seminar speaker. Computational Science Seminars. Department of Mathematics, University of Massachusetts Dartmouth, North Dartmouth, MA. May 3, 2016.

75. Finite element circus, University of Maryland, College Park, MD. April 15-16, 2016.

76. Applied Math Seminar speaker at Technische Universität München, Germany. April 13, 2016.

77. Minisymposium speaker. SIAM Conference on Uncertainty Quantification. April 5-8, 2016. EPFL, Lausanne, Switzerland.

78. Colloquium speaker at Weierstrass Institute, Berlin, Germany, March 2, 2016.

79. Colloquium, Department of Mathematics and Statistics, UNC Charlotte. February 12, 2016.

80. Numerical Analysis Seminar at the University of Maryland, College Park. February 9, 2016.

81. **Keynote speaker** at the SIAM student Chapter, Iowa State University January 27, 2015. `https://www.stuorg.iastate.edu/site/siam-isu/photo-gallery/182/album`

82. Colloquium speaker at Department of Mathematics, Iowa State University January 26, 2015.

83. Seminar speaker at Department of Mathematics, North Carolina State University January 22, 2015.

84. Minisymposium speaker. Advances in Finite and Boundary Elements. WONAPDE 2016, Chile, January 11-15, 2016.

85. Minisymposium speaker. Computational Electromagnetism. WONAPDE 2016, Chile, January 11-15, 2016.

2015

86. Colloquium speaker at Naval Research Labs (NRL). December 15, 2015.

87. Computational/Applied Math Seminar, Department of Mathematics, University of Tennessee, October 28, 2015.

88. Minisymposium speaker. Advances in Numerical Methods for PDEs with Applications. SIAM PDE, Scottsdale Arizona. December 7-10, 2015.

89. Applied and Computational Math Seminar. George Mason University, Fairfax, VA. September 11, 2015.

90. Colloquium speaker at Department of Mathematics, Humboldt Universität Zu Berlin, Germany, July 2015.

91. Minisymposium speaker. The International Symposium on Optimization (ISMP) 2015. Carnegie Mellon University and University of Pittsburgh. July 12-17, 2015.

92. **Summer School Teacher.** Ciudad Real Numerica 2015. Topic: Numerical Methods for Optimal Control Problems. Ciudad Real, Spain. June 29-July 2, 2015.

93. Invited lecture at EXTREEMS Undergraduate Research Program. George Mason University, Fairfax, Virginia. May 20, 2015.

94. Invited speaker at DelMar Numerics Day, Annual Workshop on Computational Mathematics, United State Naval Academy, Annapolis, May 9, 2015.

95. PDE Seminar speaker at George Mason University, Fairfax, Virginia. April 27, 2015.

96. Finite element circus, George Mason University, Fairfax, Virginia. March 27-28, 2015.

97. Minisymposium speaker. Reduced-order Models for PDE-constrained Optimization Problems. SIAM Conference on Computational Science and Engineering. March 14-18, 2015.

98. Applied Math Seminar speaker at Technische Universität München, Germany. March 12, 2015.

99. Invited speaker at Workshop on Numerical Methods for Optimal Control and Inverse Problems. Technische Universität München, Germany. March 9-11, 2015.

100. Scientific Computing Seminar at Division of Applied Mathematics, Brown University. February 6, 2015.

101. Differential Equation Seminar speaker at Department of Mathematics, University of Maryland, Baltimore County. February 2, 2015.

102. Applied Math Seminar speaker at Sandia National Laboratories - Livermore, CA. January 13, 2015.

2014

103. Minisymposium speaker. Title: Geometric Discretization Methods and Adaptivity. CMS Winter Meeting, Hamilton, Ontario. December 5-8, 2014.

104. Finite element circus, IMA University of Minnesota, October 24-25, 2014.

105. **Plenary speaker** at Modeling, Analysis and Computing in Nonlinear PDEs. Chateau Liblice, Prague, Czech Republic. September 21-26, 2014.

106. Minisymposium speaker. Title: Complex fluids. SIAM annual meeting, July 7-11, 2014.

107. Minisymposium speaker. Title: Model reduction: new trends and recent advances. International conference on spectral and higher order methods. June 23-27, 2014.

108. Colloquium speaker at Department of Mathematics, Humboldt Universität Zu Berlin, Germany, June 11, 2014.

109. Minisymposium speaker. Title: Nonsmooth PDE-constrained optimization. SIAM conference on optimization. May 19-22, 2014.

110. Invited speaker at DelMar Numerics Day, Annual Workshop on Computational Mathematics, University of Maryland, Baltimore County, May 10, 2014.

111. Minisymposium speaker. Title: Advanced Applications of Finite Element Methods. SIAM Seas, March 28-30, 2014.

112. Finite element rodeo, University of Texas, Austin, Texas, February 28 - March 1, 2014.

113. Colloquium, Department of Mathematics, James Madison University, January 27, 2014.

2013

114. AG-Seminar Optimierung, Department of Mathematics, TU Darmstadt, Germany, December 17, 2013.

115. Applied and Computational Mathematics Division Seminar Series at the National Institute of Standards and Technology (NIST), December 2, 2013.

116. Colloquium, Department of Mathematics, University of Tennessee, November 22, 2013.

117. Computational/Applied Math Seminar, Department of Mathematics, University of Tennessee, November 20, 2013.

118. Finite element circus, University of Delaware, Newark, Delaware, October 18-19, 2013.

119. Computational Math Seminar, University of Pittsburgh, September 24, 2013.

120. **Plenary speaker** at Domain Decomposition Methods for Optimization with PDE Constraints. Ascona, Switzerland, September 1-6, 2013.

121. A Stokes Free Boundary Problem with Surface Tension Effects. ENUMATH, Switzerland, August 26-30, 2013.

122. A Stokes Free Boundary Problem with Surface Tension Effects. ICCOPT, Portugal, July 27 - August 1, 2013.

123. A Stokes Free Boundary Problem with Surface Tension Effects. Numerical Approximation of PDEs, Italy March 20-21, 2013.

124. Two-step Greedy Algorithm for Reduced Order Quadratures. SIAM Conference on Computational Science and Engineering, Boston February 25-March 1, 2013.

125. Two-step Greedy Algorithm for Reduced Order Quadratures. WONAPDE 2013, Chile, January 14-18, 2013.

126. Optimal Control of a Free Boundary Problem with Surface Tension Effects. WONAPDE 2013, Chile, January 14-18, 2013.

2012

127. Optimal Control of a Free Boundary Problem with Second Order Sufficient Conditions. Mathematisches Forschungsinstitut Oberwolfach, Germany, November 25-December 1, 2012.

128. Optimal Control of a Free Boundary Problem with Surface Tension Effects. United State Naval Academy, Annapolis, November 7, 2012.

129. Optimal Control of a Free Boundary Problem with Surface Tension Effects. Louisiana State University, November 6, 2012.

130. Optimal Control of a Free Boundary Problem. Finite Element Circus, October 2012, University of Pittsburgh, Pittsburgh.

131. Finite Element Methods for Linear and Nonlinear PDEs. REU, George Mason University, July 18, 2012.

132. Optimization and Model Reduction of PDE-Constrained Problems. Humboldt Universität Zu Berlin, June 27, 2012.

133. Application-Specific, Fast, High Accuracy Reduced Order Quadratures with Application to Gravitational Waves. Delaware Maryland Numerics Day (DelMar), University of Delaware, April 28, 2012.

134. Application-Specific, Fast, High Accuracy Reduced Order Quadratures. SIAM Conference on Uncertainty Quantification, Raleigh, North Carolina, April 4, 2012.

135. Optimal Control of a Free Boundary Problem with Second Order Sufficient Optimality Conditions. SIAM, SEAS, University of Alabama, Huntsville, March 24-25, 2012.

136. Optimal Control of a Free Boundary Problem with Second Order Sufficient Optimality Conditions. Numerical Analysis and PDE Seminar, University of Delaware, March 15, 2012.

137. Application-Specific, Fast, High Accuracy Reduced Order Quadratures. Texas Finite Element Rodeo, February 2012, Rice University, Houston, Tx.

138. Reduced Order Modeling for Parametric Nonlinear PDE Constrained Optimization Problems. Scientific Computing Seminar, George Mason University, January 27, 2012.

139. Reduced Order Modeling for Parametric Nonlinear PDE Constrained Optimization Problems. Computational and Applied Mathematics Colloquium, Penn State University, January 20, 2012.

140. Optimal Control of a Free Boundary Problem with Second Order Sufficient Optimality Conditions. CCMA Luncheon Seminar, Penn State University, January 20, 2012.

2011

141. A Primal-Dual Active Set Strategy to Solve Optimal Control Problem With State and Gradient Constraints. Finite Element Circus, October 2011, University of Connecticut, Connecticut.

142. Optimal Control of a Free Boundary Problem with Second Order Sufficient Optimality Conditions. ICIAM, Vancouver, July 18-22, 2011.

143. Reduced Order Modeling for Parametric Nonlinear PDEs Using POD-DEIM. ICIAM. Vancouver, July 18-22, 2011.

144. Reduced Order Modeling for Parametric Nonlinear PDE Constrained Optimization Problems. Texas Finite Element Rodeo, February 2011, Texas A & M, College Station.

145. Reduced Order Modeling for Parametric Nonlinear PDE Constrained Optimization Problems. Schlumberger Oilfield Services, Sugar Land, Tx, Feb 24, 2011.

2010

146. Reduced Order Modeling for Parametric Nonlinear PDEs Using POD-DEIM. Scientific Computing Seminar, University of Houston, November 11, 2010.

147. Reduced Order Modeling for Parametric Nonlinear PDEs Using POD-DEIM. Scientific Computing and Numerical Analysis Seminar, Rice University, October 20, 2010.

148. Reduced Order Modeling for Parametric Nonlinear PDE Constrained Problems Using POD-DEIM. Workshop on Model Management and Reduced Order Model Approaches for Simulation Driven Optimization, Rice University, October 11-12, 2010.

149. Goal Oriented A Posteriori Error Estimates for the Linear-Quadratic Optimal Control Problems Using POD. Workshop: Optimal Control of PDEs, Cortona, July, 12-17, 2010.

150. Reduced Order Modeling Based Shape Optimization of Time Dependent PDE-Constrained Optimization Problems. Numerical Analysis Seminar, University of Maryland, March 9, 2010.

151. Model Reduction and Shape Optimization of Microfluidic Biochips. Texas Finite Element Rodeo, February 2010, SMU, Dallas.

152. Optimization and Model Reduction of Time Dependent PDE-Constrained Optimization Problems. Sandia National Laboratories, Albuquerque, New Mexico, January 11, 2010.

2009

153. Optimization and Model Reduction of Time Dependent PDE-Constrained Optimization Problems. MoRePaS, Model Reduction of Parametrized Systems, University of Münster, Germany, September 16-18, 2009.

154. Domain Decomposition and Model Reduction for Shape Optimization Problems. Texas Finite Element Rodeo, March 2009, ICES University of Texas, Austin.

155. Shape Optimization Governed by the Heat and the Stokes Equations Using Domain Decomposition and Model Reduction. Mathematisches Forschungsinstitut Oberwolfach, Germany, January 25-31, 2009.

2008

156. Electro-Magnetic Logging in 3D Anisotropic Media Using an Efficient FD Scheme, June 2008, University of Augsburg, Germany.

157. Primal-Dual Interior-Point Methods for Shape Optimization Problems. Texas Student SIAM Conference, 2008, Rice University.

2007

158. Adaptive Multilevel Path-following Primal-Dual Interior-Point Methods for Shape Optimization in Stationary Flow Problems. SIAM Conference on Control and its Applications, June 2007, San Francisco.

159. Path-following Primal-Dual Interior-Point Methods for Shape Optimization in Stationary Flow Problems. Texas Finite Element Rodeo March 2007, University of Houston.