

## Personal Data

Contact: Center of Mathematics and Artificial Intelligence (CMAI)  
 Department of Mathematical Sciences  
 George Mason University  
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 Personal Website: <http://math.gmu.edu/~hantil>

Place & Year of Birth: Haryana, India in 1983.  
 Family : Married and have one son  
 Citizenship : United States of America

## 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

March 2020 - Current	<b>Director:</b> <b>Center of Mathematics and Artificial Intelligence (CMAI)</b>
July 2021 - Current	<b>co-Editor in Chief (EiC):</b> <i>Advances in Continuous and Discrete Models (ACDM)</i> , Springer
August 2021 - Current	Professor George Mason University Fairfax, VA.
August 2017 - August 2021	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

August - December 2020	Research Fellow at ICERM, Brown University
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

July 11 - 14, 2018	Department of Mathematics, University of Freiburg, Germany.
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 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.
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 (ii) calculus of variations; (iii) inverse problems; (iv) numerical analysis; (iv) scientific computing and software development; (v) dimensional reduction; (vi) deep learning; (vii) artificial intelligence

## External Funding (~\$3.2M)

### Research Grants

Aug. 2021 - July 2024	Total Amount: \$340,000 Funding agency: National Science Foundation (DMS-2110263) Project name: <i>Algorithms and Numerics for Optimization Problems with PDEs</i> Single-PI: <b>H. Antil</b>
Sep. 2021 - Feb. 2022	Total Amount: \$180,000 Funding agency: Defense Threat Reduction Agency (DTRA) Project name: <i>Numerically Inspired Deep Neural Nets for Chemically Reacting Flows</i> co-PI: <b>H. Antil</b> Other co-PIs: R. Löhner and F. Togashi

May 2021 - July 2022	Total amount: \$500,000 Funding Agency: Air Force Office of Scientific Research (AFOSR) Project Name: Optimization, Control, Networks and Learning from Data PI: <b>H. Antil</b> co-PIs: R. Löhner, M. Warma
July 2020 - December 2021	Total amount: \$21,242 Funding Agency: NIST: National Institute of Standards and Technology Project Name: Algorithms for Image and Shape Analysis in 3d PI: <b>H. Antil</b>
July 2020 - July 2021	Total amount: \$150,000 Funding Agency: Defense Threat Reduction Agency (DTRA) Project Name: NNCHEM: Neural-Net/Deep Learning Based Chemical Reaction Package PI: Rainald Löhner and <b>H. Antil</b>
February 2020 - February 2022	Total amount: \$200,000 Funding agency: Department of Navy, Naval PostGraduate School Award NO: N00244-20-1-0005 Project Name: <i>Constrained Optimization and Machine Learning</i> Single-PI: <b>H. Antil</b> .
July 2019 - June 2022	Total amount: \$320,000 (GMU share: \$100,000) Funding agency: National Science Foundation (DMS-1913004) Project Name: <i>Collaborative Research: Multilevel Methods for Optimal Control of Partial Differential Equation and Optimization-Based Domain Decomposition.</i> Single-PI at GMU: <b>H. Antil</b> . Other collaborators: Andrei Draganescu, Bedrich Sousedik (UMBC).
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: <i>Structure Exploiting Trust Regions for Bilevel and Risk-Averse Optimization</i> Single-PI: <b>H. Antil</b>
Jan. - May, 2019	Total amount: \$22,236 Funding agency: Contract with Sandia National Laboratories, Albuquerque, NM Project name: <i>Fractional differential operators for features detection in the subsurface</i> Single-PI: <b>H. Antil</b> .
Aug. 2018 - July 2021	Total Amount: \$200,000 Funding agency: National Science Foundation (DMS-1818772) Project name: <i>PDE Constrained Optimization: Algorithms, Numerics, and Applications</i> Single-PI: <b>H. Antil</b>
Jan. - May, 2018	Total amount: \$15,472 Funding agency: Contract with Sandia National Laboratories, Albuquerque, NM Single-PI: <b>H. Antil</b> .

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

### Conference/Workshop Grants

October 2021 Total amount: \$30,000  
 Funding agency: Lorentz Center (Netherlands)  
 Project Name: Workshop: Nonlocality in Analysis, Numerics and Applications  
 PI: **H. Antil**, Patrick Dondl, Qiang Du and Carolin Kreisbeck

April 2019 - August 2021 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 COS (\$5K), George Mason University  
 Workshop name: *East Coast Optimization Meeting 2019*.  
 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 - NSF 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).

### Selected Awards and Honors

- **Keynote speaker** at First AIMS-Cameroon Mathematics and its Applications Meeting. January 12-14, 2022.
- Associate editor for **SIAM J. of Sci. Computing (SISC)** since January 2022.
- **NSF research highlight:** <https://www.nsf.gov/mps/dms/documents/2020-11-Item4-Antil.pdf>
- Our research appeared in 3 **NYT articles** 2020-21.
- Associate editor for **SIAM Reviews** and member of **Gene Golub SIAM** Summer school committee since January 2021.
- **George Mason’s 2020 Career Connection Faculty Award** for making a positive impact on students’ career goals, employment plans, and graduate school preparation.
- Nominated for 2020 and 2019 George Mason University **Teaching Excellence Award**.
- **Plenary speaker** at Nonlocal Models: analysis, optimization and implementation. Trier University, Germany, July 27-30, 2020.
- **Plenary lecture** in international workshop “Analysis and Numerics of Design, Control and Inverse Problems” at Istituto Nazionale di Alta Matematica “Francesco Severi” (INdAM). Rome, Italy. July 13-17, 2020.
- **Research Fellow** for one semester at ICERM Brown University Fall 2020 (invited and accepted the invitation).
- **Research Fellow** for one semester at ICERM Brown University Spring 2020 (invited but declined due to parental leave).
- **Affiliate Professor**, Mathematical Sciences, University of Delaware (2019-Current).
- **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.
- **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**.
- **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](https://owpdb.mfo.de/detail?photo_id=21483).
- 2016 **Mason Emerging Researcher/Scholar/Creator award** finalist.
- **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.
- **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](http://owpdb.mfo.de/detail?photo_id=17252)

# National Labs and Industry Research Collaborations

## National Labs

1. **Sandia National Labs.** Drew P. Kouri, Denis Ridzal, Sean Hardesty, Chester Weiss, Bart van Bloemen Waanders, Christian Glusa, Marta D'Elia
2. **Argonne National Lab.** Wendy (Zichao) Di
3. **Lawerence Livermore National Lab.** Boyan Lazarov
4. **NIST.** Gunay Dogan.
5. **Naval Research Lab.** Ratna Khatri, Colin Olson

## Industry

5. **Blacksky.** Patrick O'Neil and Diego Torrejon
6. **The Aerospace Corporation.** Kathryn E. Brenan
7. **MathWorks**
8. **MITRE Corporation**

# Publications

## Journal Articles in Review (★★ publications with students and postdocs)

1. ★★**H. Antil**, S. Dolgov and A. Onwunta. TTRISK: Tensor Train Decomposition Algorithm for Risk Averse Optimization. Submitted 2021.
2. **H. Antil**, C.G. Gal and M. Warma. A Unified Framework for Optimal Control of Fractional in Time Subdiffusive Semilinear PDEs. Submitted 2021.
3. ★★**H. Antil** and H. Díaz. Boundary Control of Time-Harmonic Eddy Current Equations. Submitted 2021.
4. ★★**H. Antil**, T.S Brown, R. Loehner, F. Togashi, and D. Verma. Deep Neural Nets with Fixed Bias Configuration. Submitted 2021.
5. **H. Antil**, S. Kubota, K. Shirakawa, and N. Yamazaki. Temperature Control of PDE Constrained Optimization Problems Governed by Kobayashi-Warren-Carter Type Models of Grain Boundary Motions. Submitted 2021.
6. ★★ **H. Antil**, T.S. Brown, R. Khatri, A. Onwunta, D. Verma, and M. Warma. Optimal Control, Numerics, and Applications of Fractional PDEs. Submitted 2021.
7. **H. Antil**, A.N. Ceretani, and C.N. Rautenberg. The Spatially Variant Fractional Laplacian. Submitted 2021. <https://arxiv.org/pdf/2106.11471.pdf>
8. ★★ T Shi, **H. Antil**, and D.P. Kouri. Spectral, Tensor and Domain Decomposition Methods for Fractional PDEs. Submitted 2021
9. **H. Antil**, S. Bartels, and A. Schikorra. Approximation of Fractional Harmonic Maps. Submitted 2021. <https://arxiv.org/pdf/2104.10049.pdf>
10. ★★ M. Panagoda, T. Berry and **H. Antil**. Convergence Analysis of the Rank Restricted Soft SVD Algorithm. Submitted 2021. <https://arxiv.org/pdf/2104.01473.pdf>
11. ★★ **H. Antil**, H.C. Elman, A. Onwunta, D. Verma. Novel Deep Neural Networks for Solving Bayesian Statistical Inverse Problems. Submitted 2021.

12. **★H. Antil**, R. Arndt, C.N. Rautenberg and D. Verma. Non-Diffusive Variational Problems with Distributional and Weak Gradient Constraints. Submitted 2021. <https://arxiv.org/pdf/2106.12680.pdf>
13. **H. Antil**, D.P. Kouri, and D. Ridzal. ALESQP: An Augmented Lagrangian Equality-constrained SQP Method for Optimization with General Constraints. Submitted 2020.
14. S. Hardesty, **H. Antil**, D.P. Kouri, and D. Ridzal. The Strip Method for Shape Derivatives. Submitted 2020. [http://www.optimization-online.org/DB\\_HTML/2020/08/7986.html](http://www.optimization-online.org/DB_HTML/2020/08/7986.html)
15. **★H. Antil**, Hugo Diaz-Norambuena, and T.N.T. Quyen. Optimal Control of Parameterized Maxwell's System: Reduced Basis, Convergence Analysis, and A Posteriori Error Estimates. Submitted 2020. <https://arxiv.org/pdf/1908.08846.pdf>
16. **★R. Vaughn**, T. Berry, and **H. Antil**. Diffusion Maps for Embedded Manifolds with Boundary with Applications to PDEs Submitted 2020. <https://arxiv.org/pdf/1912.01391.pdf>
17. **H. Antil**, U. Biccari, R. Ponce, M. Warma, and S. Zamorano. Controllability properties from the exterior under positivity constraints for a 1-D fractional heat equation. Submitted 2019. <https://arxiv.org/pdf/1910.14529.pdf>
18. **H. Antil**, C. Lizama, R. Ponce, and M. Warma. Convergence of solutions of discrete semi-linear space-time fractional evolution equations. Submitted 2019. <https://arxiv.org/pdf/1910.07358.pdf>
19. 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>

#### Book

20. 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>

**Book Review:** SIAM Review Vol. 61, Issue 4 (December 2019)

#### Published/Accepted Articles

21. R. Löhner and **H. Antil**. High-Fidelity Simulation of Pathogen Propagation, Transmission, and Mitigation. Submitted to SIAM News 2021
22. R. Löhner, **H. Antil**, A. Srinivasan, S. Idelsohn, E. Oñate. High Fidelity Simulation of Pathogen Propagation, Transmission and Mitigation in the Built Environment. Accepted in Archives of Computational Methods in Engineering 2021.
23. **★T.S. Brown**, **H. Antil**, R. Löhner, F. Togashi, and D. Verma. Novel DNNs for Stiff ODEs with Applications to Chemically Reacting Flows. Accepted in Computational Fluid Dynamics Simulations and Analysis (CFDML) 2021. <https://arxiv.org/pdf/2104.01914.pdf>
24. **H. Antil**, P. Dondl, and L. Striet. Approximation of Integral Fractional Laplacian and Fractional PDEs via sinc-Basis. Accepted in SIAM J. of Sci. Computing 2021. <https://arxiv.org/pdf/2010.06509.pdf>
25. **★H. Antil**, T.S. Brown, D. Verma and M. Warma. Optimal Control of Fractional PDEs with State and Control Constraints. Accepted in Pure and Applied Functional Analysis, 2021.
26. **H. Antil**, T. Berry, and J. Harlim. Fractional Diffusion Maps. Accepted in Applied and Computational Harmonic Analysis (ACHA) 2021. <https://arxiv.org/pdf/1810.03952.pdf>
27. **H. Antil**, C.N. Rautenberg, A. Schikorra. On a Fractional Version of a Murat Compactness Result and Applications. Accepted in SIAM Journal of Mathematical Analysis, 2021. <https://arxiv.org/pdf/2004.01615.pdf>

28. C. Glusa, **H. Antil**, M. D'Elia, B. van Bloemen Waanders, and C.J. Weiss. A fast solver for the fractional Helmholtz equation. Accepted in SIAM Journal of Scientific Computing, 2021. <https://www.osti.gov/servlets/purl/1569144>
29. **★H. Antil**, D.P. Kouri, and J. Pfefferer. Risk-Averse Control of Fractional Diffusion with Uncertain Exponent. Accepted in SIAM Journal of Control and Optimization. 2021.
30. H. Dinh, **H. Antil**, Y. Chen, E. Cherkaev, and A. Narayan. Model reduction for fractional elliptic problems using Kato's formula. Mathematical Control & Related Fields 2021. <https://arxiv.org/pdf/1904.09332.pdf>
31. **★H. Antil**, A. Drăgănescu, K. Green. A Note on Multigrid Preconditioning for Fractional PDE-Constrained Optimization Problems. Accepted in Results in Applied Mathematics, 2021.
32. **H. Antil**. Role of Fractional Operators in Inverse Problems. Mathematisches Forschungsinstitut Oberwolfach (2020). Report No. 39/2020. DoI: DOI: 10.4171/OWR/2020/39
33. **H. Antil**. Fractional Operators: Analysis, Control, and Applications. Mathematisches Forschungsinstitut Oberwolfach (2020). Report No. 37/2020. DoI: DOI: 10.4171/OWR/2020/37
34. R. Löhner, **H. Antil**, H.R. Tamaddon-Jahromi, N.K. Chakshu, P. Nithiarasu. Deep Learning or Interpolation for Inverse Modeling of Heat and Fluid Flow Problems ? Accepted in International Journal of Numerical Methods for Heat and Fluid Flow. 2020.
35. R. Löhner and **H. Antil**. High Fidelity Modeling of Aerosol Pathogen Propagation in Built Environments with Moving Pedestrians. International Journal for Numerical Methods in Biomedical Engineering, 2020. DOI: <https://doi.org/10.1002/cnm.3428>  
Preprint: <https://arxiv.org/pdf/2009.03365.pdf>
36. R. Löhner, **H. Antil**, S. Idelsohn, E. Oñate. Detailed Simulation of Viral Propagation in Built Environment. Computational Mechanics. 2020. <https://doi.org/10.1007/s00466-020-01881-7>
37. **★H. Antil**, R. Khatri, R. Löhner, and D. Verma. Fractional Deep Neural Network via Constrained Optimization. Machine Learning: Science and Technology, 2020. DOI: <https://doi.org/10.1088/2632-2153/aba8e7>  
Preprint: <https://arxiv.org/pdf/2004.00719.pdf>
38. **H. Antil**, S. Kubota, K. Shirakawa, and N. Yamazaki. Optimal control problems governed by 1-D Kobayashi Warren-Carter Type Systems. Mathematical Control & Related Fields 2020. DOI: <http://dx.doi.org/10.3934/mcrf.2020036>  
Preprint: <https://arxiv.org/pdf/2003.01297.pdf>
39. **★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. Journal of Optimization Theory and Applications (JOTA), 2020. DOI: 10.1007/s10957-020-01684-z. Preprint: <https://arxiv.org/pdf/1906.00032.pdf>
40. **★H. Antil**, Z. Di, and R. Khatri. Bilevel optimization, deep learning and fractional Laplacian with applications in tomography. Inverse Problems **36**(6) 2020. <https://arxiv.org/pdf/1907.09605.pdf>
41. R. Löhner and **H. Antil**. Determination of volumetric material data from boundary measurements: Revisiting Calderon's Problem. International Journal of Numerical Methods for Heat and Fluid Flow. 2020. DOI: <https://doi.org/10.1108/HFF-12-2019-0931>.
42. **★H. Antil**, D. Verma, and M. Warma. External optimal control of fractional parabolic PDEs. ESAIM: Control, Optimization and Calculus of Variations (CoCV), Volume: **26**. Article Number: 20, Pages: 33, Year: 2020. DOI: <https://doi.org/10.1051/cocv/2020005>



43. C.J. Weiss, B.G. van Bloemen Waanders, and **H. Antil**. Fractional Operators Applied to Geophysical Electromagnetics. *Geophysical Journal International*, **220**(2), 1242-1259, 2020. <https://arxiv.org/pdf/1902.05096.pdf>
44. **H. Antil** and M. Warma. *Optimal control of fractional semilinear PDEs*. ESAIM: Control, Optimisation and Calculus of Variations (ESAIM: COCV), Volume: **26**, Article Number : 5, Pages: 30, 2020. DOI: <https://doi.org/10.1051/cocv/2019003>
45. **H. Antil**, Y. Chen, A. Narayan. Reduced basis methods for fractional Laplace equations via extension. *SIAM Journal of Scientific Computing* **41**(6), pp. A3552-A3575, 2019. <https://arxiv.org/pdf/1808.00584.pdf>
46. ★★ **H. Antil**, T. Brown, and F.J. Sayas. *A problem in control of elastodynamics with piezoelectric effects*. *IMA Journal of Numerical Analysis*. DOI: <https://doi.org/10.1093/imanum/drz047>. 2019. <https://arxiv.org/pdf/1802.06099.pdf>
47. **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>
48. ★★ **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.
49. **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, three years in a row 2018-20.**
50. 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.
51. **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>
52. ★★ **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.
53. ★★ **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.
54. ★★ **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.
55. ★★ **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.
56. **H. Antil** and M. Warma. *Optimal control of the coefficient for fractional p-Laplace equation: Approximation and convergence*. *RIMS Kôkyûroku*, **2090**, 102–116, 2018.
57. **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.
- Code:** [https://bitbucket.org/harbirantil/pde\\_constrained\\_opt](https://bitbucket.org/harbirantil/pde_constrained_opt)

58. **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.
59. **★★ 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.
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63. **★★ 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](http://math.gmu.edu/~hantil/Tech_Report/HAntil_JPfefferer_2017a.pdf)  
**Code:** [https://bitbucket.org/harbirantil/frac\\_poisson\\_nhbc/](https://bitbucket.org/harbirantil/frac_poisson_nhbc/)
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[Among 10 most read articles of 2016-17.](#)
72. **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.

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74. \*\* **H. Antil**, and E. Ot rola. *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.**
75. \*\* **H. Antil**, R. H. Nochetto, and P. Sodr . *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.
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- **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>.
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- Most cited article in this journal. Years 2012-13.**
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86. **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.
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#### Others

91. **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. **H. Antil**. *PDE Constrained Optimization (code)*. 2018. [https://bitbucket.org/harbirantil/pde\\_constrained\\_opt](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](http://math.gmu.edu/~hantil/Tech_Report/HAntil_JPfefferer_2017a.pdf)  
**Code:** [https://bitbucket.org/harbirantil/frac\\_poisson\\_nhbc/](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. Co-organizer of International workshop on **Nonlocality in analysis, numerics and applications**. Lorentz Center, Leiden, Netherlands. October 25-29, 2021. Co-organized with Carolin Kreisbeck (Utrecht University, Netherlands), Patrick Dondl (University of Freiburg, Germany), Qiang Du (Columbia University, USA)
2. Organizer and chair of **CMAI Meets Industry Symposium** June 25, 2021. <https://math.gmu.edu/~hantil/CMAI/Industry/2021/>
3. Organizer and chair of **CMAI Summer School on Risk-Averse PDE-Constrained Optimization: Theory, Numerical Solution, and Open Problems** June 18, 2021. <https://math.gmu.edu/~hantil/CMAI/SummerSchool/2021/Surowiec/>
4. **Annual East Coast Optimization Meeting (ECOM) organizer and chair** Second workshop (virtual): April 1-2, 2021 George Mason University, Fairfax, VA Co-organized with Drew Kouri and Denis Ridzal (Sandia National Laboratories) <http://math.gmu.edu/~hantil/ECOM/2021/>
5. **Co-organizer and Member of Scientific Committee** “Sayas Numerics Day” an annual conference in Computational Mathematics. University of Maryland, Baltimore County, May 9, 2020. Meeting cancelled due to COVID.
6. **Annual East Coast Optimization Meeting (ECOM) organizer and chair** Second workshop: April 2-3, 2020 George Mason University, Fairfax, VA Co-organized with Drew Kouri and Denis Ridzal (Sandia National Laboratories) <http://math.gmu.edu/~hantil/ECOM/2020/> Meeting cancelled due to COVID.
7. **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.
8. **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>
9. **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.

10. **Summer school/Workshop organizer and co-chair:** 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).  
<https://stinga.public.iastate.edu/NSFE2017.html>  
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).
11. **Conference organizer and chair:** 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](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.
12. **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.
13. **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.
14. **Conference organizer and chair:** 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*

15. **Minisymposium organizer:** Structure-exploiting algorithms for large-scale continuous optimization.  
SIAM SIAM Conference on Optimization, Spokane WA.  
July 19 - 23, 2021.  
Co-organized with Drew P. Kouri and Denis Ridzal (Sandia National Labs)  
Total 8 speakers
16. **Minisymposium organizer:** Nonlocal Analysis and Numerics.  
SIAM Annual Meeting, Spokane WA.  
July 19 - 23, 2021.  
Co-organized with Patrick Dondl (University of Freiburg, Germany).  
Total 8 speakers
17. **Minisymposium organizer:** Optimal Control and Deep Learning.  
SIAM Conference on Computational Science and Engineering (CSE), Spokane WA.  
March 1 - 5, 2021.  
Co-organized with T.S. Brown, R. Khatri, and D. Verma.  
Total 10 speakers

18. **Minisymposium organizer:** Nonlocal PDEs and Calculus of Variations.  
IFIP TC7 Conference on System Modelling and Optimization, Quito, Ecuador.  
August 31-September 4, 2020.  
Co-organized with C.N. Rautenberg and M. Warma (GMU)  
(Meeting postponed due to COVID)
19. **Minisymposium organizer:** Optimal control and learning.  
(virtual) SIAM Conference on Mathematics of Data Science, Cincinnati, OH. May 5-7, 2020.  
Co-organized with T.S. Brown and R. Khatri (George Mason University).  
Total 8 speakers.
20. **Minisymposium organizer:** Optimization with PDE Constraints: Analysis and Numerics.  
SIAM Conference on Analysis of Partial Differential Equations, La Jolla, CA. December 11-14, 2019.  
Co-organized with Dmitriy Leykekhman (University of Connecticut).  
Total 5 speakers.
21. **Minisymposium organizer:** Fractional/Nonlocal PDEs: Applications, Control, and Beyond.  
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.
22. **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.
23. **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
24. **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.
25. **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)
26. **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)
27. **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).

28. **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).
29. **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).
30. **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).
31. **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).

### *Colloquium organizer at GMU*

32. Chair of the Center for Mathematics and Artificial Intelligence (CMAI) Colloquium.  
I initiated this one of its kind virtual Colloquium Series in May 2020 under CMAI. Throughout the Summer 2020, it was regularly attended by around 60-70 people every week.  
**For Fall 2020, we have 450 registered participants from 6 continents.**

### *Seminar organizer at GMU*

33. **Organizer and chair.** Satellite Image Analysis via Deep Learning, George Mason University, Spring 2019.  
The seminar is regularly attended by over 40 participants.
34. **Organizer and chair** PDE Control Seminar, George Mason University, every semester since Fall 2013.
35. **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 7 years. These visitors also give talks in our Applied Math Seminar.

### **Editorial Board.**

- *Associate Editor.* SIAM Journal of Scientific Computing  
January 2022 - December 2024
- *Editor in Chief (EiC):* Advances in Discrete and Continuous Models  
July 2021 - Current
- *Associate Editor.* SIAM Reviews  
January 2021 - December 2023 ([number one journal in the Applied Mathematics](#))
- *Associate Editor.* “Mathematical Control and Related Fields” (MCRF)  
January 1, 2019 - December 31, 2022.  
<http://www.aimsociences.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 Math Analysis – 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 and International Scientific, Government, and Professional Committees**

*Evaluator* of W3 (Full Professor) in Data Science in Germany

*Member*, Gene Golub SIAM Summer School Committee, 2021–2024.

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

### **International Panel participation**

Austrian Science Fund (FWF) (mail in review) (2020)

Chilean National Foundation (2017)

Indo-U.S. Science & Technology Forum (IUSSTF) (2018)

### **National Panel participation**

Department of Energy (panel) 2021

AirForce Office of Scientific Research (AFOSR) YIP Program (mail in review) (2020)

Department of Energy ASCR Leadership Computing Challenge (ALCC) (mail in review) (2020)

National Science Foundation (panel) (2020)

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)

### **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 2021.

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 members)

Committee for Reappointment of Department Chair - D. Walnut.  
Graduate Committee (April 2018 - 2020)

### 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, Fall 2019, Spring 2020, Fall 2020.

### 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 2021	Math 463 / Math 663 ( <b>New course created</b> ).
Fall 2021	Math 462 / Math 662 ( <b>New course created</b> ).
Fall 2021	Math 697 - David Sayre (4 credits)
Fall 2021	Math 998 - Kiefer Green (2 credits)
Spring 2021	Optimization, nonlinear PDEs & Deep Learning ( <b>New special topics class</b> )
Mahendra Panagoda	Math 999 (1 credit)
Deepanshu Verma	Math 998 (6 credits)
David Sayer	Math 697 (3 credits)
Fall 2020	Research Fellow at ICERM, Brown University.
Spring 2020	Math 999 - Ratna Khatri (9 credits) Math 998 - Deepanshu Verma (8 credits)
Fall 2019	Math 678 - Partial Differential Equations
Fall 2019	Math 113 - Analytic Geometry and Calculus I
Fall 2019	Math 697 - Ratna Khatri (3 credits)
Fall 2019	Math 697 - Igor Semyonov (3 credits)
Fall 2019	Math 697 - Mahendra Panagoda (1 credit)
Fall 2019	Math 998 - Ratna Khatri (6 credits)
Fall 2019	Math 998 - Deepanshu Verma (5 credits)
Fall 2019	Dissertation credit at Univ. of Delaware - Hugo Díaz-Norambuena (6 credits)
Fall 2019	PDE-Control Seminar - Linear Algebra and Data Analysis
Spring 2019	Math 689 - Deep Learning and Optimization Under Uncertainty ( <b>new special topics class</b> )
Spring 2019	Math 697 - Deepanshu Verma (2 credits)
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 Math 697 - Deepanshu Verma (2 credits)  
 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 Uncertainty 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 Math 697 - Ratna Khatri (3 credits)  
 Fall 2016 Math 697 - Sayomi Stallings (3 credits)  
 Fall 2016 PDE-Control Seminar  $\Gamma$ -convergence  
  
 Spring 2016 Pre-tenure sabbatical  
  
 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 Math 697 - Mahendra Panagoda (1 credit)  
 Spring 2015 PDE-Control Seminar on Optimization with PDE Constraints - I  
  
 Fall 2014 Math 113 - Analytic Geometry and Calculus I  
 Fall 2014 Math 697 - Mahendra Panagoda (1 credit)  
 Fall 2014 PDE-Control Seminar on Optimization in Finite dimensions  
  
 Spring 2014 Math 689 - Finite Element Methods for PDE (**new special topics class**).  
 Fall 2014 Math 697 - Mahendra Panagoda (1 credit)  
 Spring 2014 PDE-Control Seminar on Finite Element Methods  
  
 Fall 2013 Math 413 (Modern Applied Math I)  
 Fall 2013 Math 405 - Alexander Goldstone (3 credits)  
 Fall 2013 Math 697 - Diego Torrejon (3 credits)  
 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

Hugo Díaz-Norambuena Current (PhD) at University of Delaware  
 Kiefer Green Current (PhD)  
 David Sayre Current (PhD)  
 A.J. Bailey Current (PhD) jointly with Mahamadi Warma  
 Mahendra Panagoda PhD at George Mason University (August 2021) jointly with Tyrus Berry.  
*Thesis:* Convergence Analysis and Bilevel Optimization Algorithms  
 for Matrix Completion Problems  
 Deepanshu Verma PhD at George Mason University (August 2021).  
*Thesis:* Optimal Control Problems Constrained by Fractional PDEs  
 and Applications to Deep Neural Networks  
*First Position:* Distinguished Visiting Assistant Professor, Emory University  
 Ratna Khatri PhD at George Mason University (May 2020)  
*Thesis:* Role of Nonlocal Operators in Inverse and Deep Learning Problems  
*First Position:* Research Scientist at U.S. Naval Research Laboratory  
 Patrick Sodré PhD at University of Maryland (with R.H. Nochetto in May 2013).  
*Thesis:* Optimal control for free boundary problems.  
*First Position:* Senior Research Scientist at Intelligent Automation, Inc.

### Other Ph.D. students

Tianyi Shi PhD expected in May 2022 at Cornell University.  
*Title:* Tensor Methods for Fractional PDEs  
 Summer 2019 at GMU with H. Antil

### MS Students

John Maxwell MS Math (May 2021)  
*Title:* Diametrical Risk Minimization  
*First Position:* Research Scientist at Institute for Defense Analyses (IDA)  
 Igor Semyonov MS Math (December 2019)  
*First Position:* Research Scientist at Army Night Vision Lab  
 Dennis Marti MS-Math (May 2019)  
*First Position:* Data Scientist at Verizon  
 Justin Thorpe MS-Math (May 2018)  
*First Job:* PhD student Department of Mathematical Sciences, GMU.  
 Tuan Le MS-Math (December 2017)  
*Title:* PDE Constrained Optimization under Uncertainty  
*First Job:* PhD student at Systems Engineering and Operations Research, GMU

### PostDocs

Randy Price September 2021 - Current  
 Evelyn Herberg August 2021 - Current  
 Akwum Onwunta August 2020 - August 2021.  
*First Position:* Tenure-track Assistant Professor at Lehigh University  
 Thomas S. Brown May 2019 - July 2021.  
 Johannes Pfefferer George Mason University (October 2015 - December 2015).  
*First Position:* 'Akademischer Rat' (permanent position) at  
 Technical University, Munich, Germany.  
 Pablo Venegas George Mason University (August 2015 - December 2015).  
*First Position:* Professor, Universidad del Bio-Bio, Concepcion, Chile.  
 Enrique Otárola George Mason University (August 2014 - June 2015).  
*First Position:* Professor, Santa Maria, Santiago, Chile.

### Undergraduate

- Brendan Gramp    Extreems, George Mason University (May 2018 - May 2019)  
*First Position:* 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 Position:* Math PhD student at University of Maryland, College Park.
- Mae Markowski    Extreems, George Mason University (May 2015 - current).  
*First Position:* 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 Position:* Math PhD student at University of North Carolina at Chapel Hill.  
 Currently a postdoc at Berkeley Lab
- Alexander Goldstone    URCM 2013-14, George Mason University.  
*First Position:* PhD student in Electrical Engineering at GMU.

## PhD Dissertation Committee

### Current

Eric Winter (Physics), George Mason University, Fairfax  
 Sumaya Alzuhairy (Math), University of Maryland, Baltimore County.  
 Mike Retzlaff (Math), University of Maryland, Baltimore County.

### Past

Rafael Arndt (Math), George Mason University, Fairfax  
 Dharmendra Kumar (Math), Indian Institute of Technology (IIT), Gandhinagar, India  
 Jeff Snider (Math), George Mason University, Fairfax.  
 Stephen Wheatley (Math), George Mason University, Fairfax.  
 Diego Torrejon (Math), George Mason University, Fairfax.  
 Sergejs Rogovs (Math), University of Bundeswehr Munich, Germany.  
 James Cameron (Math), George Mason University, Fairfax.  
 Mona Hajghassem (Math), University of Maryland, Baltimore County.  
 Patrick Sodr  (Math), University of Maryland, College Park.  
 Patrick O’Neil (Math), George Mason University, Fairfax.  
 Jyoti Saraswat (Math), University of Maryland, Baltimore County.  
 Maziar Raissi (Math), George Mason University, Fairfax.

## Research Talks

### 2022

1. **Banff International Research Station (BIRS)** workshop on Theoretical and Applied Aspects for Nonlocal Models. Banff International Research Station (BIRS) in Banff, Alberta July 17-22, 2022.
2. **Mathematisches Forschungsinstitut Oberwolfach** conference on Space-Time Methods for Time-Dependent Partial Differential Equations. Oberwolfach, Germany. February 6-12, 2022.
3. **Keynote speaker** at AIMS-Cameroon Mathematics and its Applications Meeting (ACMAM). January 12-14, 2022.

### 2021

4. Invited speaker at RAMSES: Reduced order models; Approximation theory; Machine learning; Surrogates, Emulators and Simulators. SISSA, International School for Advanced Studies, Main Campus, Trieste, Italy. 14-17 December, 2021.
5. Invited speaker in ACMD Seminar Series, NIST, MD. November 9, 2021.

6. Finite Element Circus. Penn State University. November 5-6, 2021.
  7. **Panelist and Invited speaker** under Panel on “Artificial Intelligence – Challenges and Controversies” at the Center for Intellectual Property x Innovation Policy Annual Conference, Anton Scalia Law School, GMU. October 13, 2021.
  8. Minisymposium speaker at The 15th International Conference on Free Boundary Problems: Theory and Applications 2021. Berlin, Germany. September 13–September 17, 2021.
  9. Data-Enabled Science Seminar speaker at University of Houston, Texas. September 3, 2021.
  10. Inaugural speaker at the research cluster on Control Theory and Machine Learning at Southern Methodist University, Dallas Texas. September 2, 2021.
  11. Minisymposium speaker at SIAM Conference on Optimization. Spokane, Washington. July 20-23, 2021.
  12. **Plenary** talk at “RSS 2021 Workshop on Behavioral Inference of Remotely Sensed Multi-agent Systems”. July 12-16, 2021. <https://sites.google.com/unizar.es/rss21-bi-mas/home?authuser=0>
  13. **Plenary speaker** at Nonlocal Models: analysis, optimization and implementation. Trier University, Germany, July 12-16, 2021.
  14. **Invited (plenary) speaker** at Workshop on Behavioral Inference of Remotely Sensed Multi-agent Systems at Robotics: Science and Systems. July 12-16, 2021.
  15. **Plenary lecture** in international workshop “Analysis and Numerics of Design, Control and Inverse Problems” at Istituto Nazionale di Alta Matematica “Francesco Severi” (INdAM). Rome, Italy. June 28-July 2, 2021.
  16. Data-driven Physical Simulation (DDPS) seminar at Lawrence Livermore National Lab. June 3, 2021.
  17. Minisymposium speaker at SIAM Conference on the Mathematical Aspects of Materials Science (virtual participation). May 17 - 28, 2021.
  18. Computational and Applied Mathematics Colloquium. Penn State University. April 19, 2020.
  19. Minisymposium speaker at SIAM Conference on Computational Science and Engineering (virtual meeting). March 1-5, 2021.
  20. Scientific Computing Seminar at Emory University. February 26, 2021.
  21. Invited speaker at (virtual) Lisbon Webinar in Analysis in Differential Equations, a joint initiative between several institutes (including University of Lisbon) in Lisbon Portugal. February 11, 2021.
- 2020**
22. **Mathematisches Forschungsinstitut Oberwolfach** conference on Computational Inverse Problems for Partial Differential Equations. Oberwolfach, Germany. December 6-12, 2020.
  23. **Mathematisches Forschungsinstitut Oberwolfach** conference on Nonlocal Analysis and the Geometry of Embeddings. Oberwolfach, Germany. November 22-28, 2020.
  24. **Plenary speaker** at workshop on Uncertainty Management and Machine Learning in Engineering Applications. Virtual meeting organized by Stonybrook University and Sandia National Labs. November 16-17, 2020.
  25. Speaker at 50<sup>th</sup> Finite Element (virtual) Circus. November 7-8, 2020.
  26. CAA Online Seminar Series speaker. Department of Mathematics, Friedrich-Alexander-Universität Erlangen Nürnberg, Germany. November 4, 2020.

27. Scientific Computation Seminar speaker at the University of Nottingham, United Kingdom. October 14, 2020.
  28. AIMS-Cameroon Research Center Colloquium speaker. September 22, 2020.
  29. **Tutorial (1 hour)**. 2020 SIAM/CIAM Annual Meeting. Toronto, Canada. July 6-10, 2020.
  30. Minisymposium speaker. Numerical Methods for Fractional Calculus. SIAM/CIAM Annual Meeting. Toronto, Canada. July 6-10, 2020.
  31. Minisymposium speaker. Advances in Variational Models and PDEs for Images. SIAM Conference on Imaging Science (IS20). July 6-9, 2020, Toronto, Canada.
  32. Minisymposium speaker. Advances in regularization techniques for ill-posed problems. SIAM Conference on Imaging Science (IS20). July 6-9, 2020, Toronto, Canada.
  33. Minisymposium speaker. Numerical Methods for Optimization Problems with PDE Constraints. International Conference on Computational Methods and Applications in Engineering (ICCMAE). Mississippi State University. May 7-9, 2020. Meeting cancelled due to COVID.
  34. Minisymposium speaker. SIAM Conference on Optimization (OP20). The Hong Kong Polytechnic University, Hung Hom Campus, Hong Kong. May 26 - 29, 2020. Meeting postponed due to COVID.
  35. Minisymposium speaker. Recent Advances in Adaptive Mesh Refinement and A Posteriori Error Estimation. AMS Spring Central Sectional Meeting at Purdue University. April 4-5, 2020. Meeting cancelled due to COVID.
  36. **Winter School Teacher and Plenary speaker** at Workshop on Finite Elements for Nonlinear and Multiscale Problems. Indian Institute of Sciences (IISc), Bangalore, India. Feb 28 – Mar 03, 2020 <http://math.iisc.ernet.in/~gudi/FEM-Workshop.pdf>
  37. Colloquium. Department of Mathematics and Statistics, University of Maryland Baltimore County. January 31, 2020.
- 2019**
38. Invited speaker (45min **invited** talk) at Workshop on “Optimization and Inversion under Uncertainty”, November 11-15, 2019, Radon Institute for Computational and Applied Mathematics (RICAM), Linz, Austria.
  39. Finite Element Circus. Department of Mathematics, Virginia Tech, November 1-2, 2019.
  40. Invited speaker (45min **invited** talk) at Workshop on “Optimal Control and Optimization for Nonlocal Models”, October 28-30, 2019, Radon Institute for Computational and Applied Mathematics (RICAM), Linz, Austria.
  41. Analysis seminar at Department of Mathematics, University of Pittsburgh. October 3, 2019.
  42. Numerical analysis seminar speaker Department of Mathematics, University of Maryland, College Park. September 24, 2019.
  43. Colloquium, Department of Mathematical Sciences, George Mason University. Fairfax, VA. September 20, 2019.
  44. Invited talk at Air Force Office of Scientific Research annual meeting of Optimization program. August 22-23, 2019.
  45. Minisymposium speaker. The Sixth International Conference on Continuous Optimization (ICCOPT). Berlin, Germany. August 5-8, 2019.
  46. Colloquium speaker at BlackSky, Virginia. May 10, 2019.

47. Applied and Computational Math Seminar speaker. Rutgers University. April 26, 2019.
  48. Numerical Analysis and Scientific Computing Seminar. Courant Institute, New York University (NYU). March 15, 2019.
  49. Minisymposium speaker: Recent Advances in PDE-constrained Optimization under Uncertainty. SIAM CS & E. February 25 - March 1, 2019. Spokane, Washington.
  50. Minisymposium speaker: Methods for Large-Scale Risk-Averse Optimization. SIAM CS & E. February 25 - March 1, 2019. Spokane, Washington.
  51. Invited speaker at Francisco Javier-Sayas Fest at University of Delaware. February 16, 2018.
- 2018**
52. Analysis and Differential Equations Colloquium speaker. University of Lisbon, Portugal, December 20, 2018.
  53. 2018 American Geophysical Union meeting Washington D.C. 10-14 Dec 2018.
  54. Semi-plenary Speaker at “Dynamics, Control and Numerics for Fractional PDEs”, Puerto Rico, December 5-7, 2018.
  55. Applied and Computational Math Seminar speaker at George Mason University, Fairfax, VA. November 16, 2018.
  56. Finite Element Circus. Department of Mathematics, University of Delaware. November 9-10, 2018.
  57. Speaker at Applied Interdisciplinary Mathematics (AIM) graduate student seminar. University of Michigan, Ann Arbor. October 26, 2018.
  58. Speaker at Applied Interdisciplinary Mathematics (AIM) Seminar. University of Michigan, Ann Arbor. October 26, 2018.
  59. SIAM Faculty Symposium, George Mason University, Fairfax VA. October 12, 2018.
  60. Minisymposium speaker “Numerical approximation of fractional differential equations” at SIAM Texas-Louisiana Section, Louisiana State University, October 5-7, 2018.
  61. Minisymposium speaker “Numerical Geometric PDE” at SIAM Texas-Louisiana Section, Louisiana State University, October 5-7, 2018.
  62. **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.
  63. Speaker at COS-VSE lunch seminar. George Mason University. September 20, 2018.
  64. Colloquium at United States Naval Academy, Annapolis, Maryland. September 14, 2018.
  65. Applied Numerical Analysis Seminar speaker at Department of Mathematics, Virginia Tech. September 19, 2018.
  66. Continuum Mechanics Seminar speaker at University of Nebraska-Lincoln. September 6, 2018.
  67. Invited speaker at AFOSR Optimization and Discrete Math Program Review. Arlington, VA. August 23-24, 2018.
  68. Colloquium at Naval Research Lab, Washington D.C. July 25, 2018.
  69. Colloquium at Department of Mathematics, University of Freiburg. Freiburg, Germany. July 13, 2018.
  70. Colloquium at Department of Mathematics, Technical University Munich, Germany. July 9, 2018.



71. Minisymposium speaker at The International Symposium on Optimization (ISMP) 2018. July 1-6, 2018, Bordeaux, France.
  72. Minisymposium speaker at SIAM Conference on Imaging Science. June 5-8, 2018. Bologna, Italy.
  73. Minisymposium speaker at SIAM Conference on Uncertainty Quantification. April 16-19, 2018. Garden Grove, California.
  74. **Winter school organizer and teacher.** IIT Bombay, India. March 12-16, 2018.
  75. COS-VSE Seminar Series speaker. George Mason University. March 23, 2018.
  76. PDE and Topology Seminar speaker, University of Connecticut. February 05, 2018.
  77. Applied and Computational Math Seminar speaker. George Mason University, February 02, 2018.
  78. Computational and Applied Mathematics Colloquium. Penn State University. 08 Jan 2018.
  79. Graduate student seminar. Penn State University. 08 Jan 2018.
- 2017**
80. Invited speaker at workshop Modeling, Analysis and Numerics for Nonlocal Applications (MANNA). Santa Fe, NM Dec 11-15, 2017.
  81. Invited speaker (software session) at workshop Modeling, Analysis and Numerics for Nonlocal Applications (MANNA). Santa Fe, NM Dec 11-15, 2017.
  82. Numerical Analysis and PDE Seminar speaker, University of Delaware, December 7, 2017.
  83. Applied and Computational Math Seminar. Rutgers University. December 1, 2017.
  84. Colloquium speaker. Department of Mathematics, University of Nebraska-Lincoln, Lincoln, NE 68588. November 3, 2017.
  85. Mechanics seminar speaker. Department of Mathematics, University of Nebraska-Lincoln, Lincoln, NE 68588. November 1, 2017.
  86. **Keynote Speaker.** RIMS conference on Theory of Evolution Equations and Mathematical Analysis of Nonlinear Phenomena. Kyoto, Japan, October 18-20, 2017.
  87. Mechanical Engineering and Materials Science (MEMS) Seminar Duke University. October 11, 2017.
  88. **Summer school teacher.** Department of Mathematics, Technical University Munich, Germany. July 31-August 4, 2017. <http://www.igdk.eu/IGDK1754/CCAnti12017>
  89. Minisymposium speaker: Mathematical Congress of Americas, Montreal, Canada. July 24-28, 2017.
  90. Minisymposium speaker: Optimal control of fractional PDEs. SIAM Control and Optimization. July 10-12, 2017. Pittsburgh.
  91. **Summer school teacher.** Mason Modeling Days, George Mason University, Fairfax, VA. June 28-July 1, 2017.
  92. Minisymposium speaker: Optimization with PDEs: Theory and Numerics, SIAM Optimization. Vancouver, Canada. May 22-25, 2017.
  93. Scientific Computing Seminar at Division of Applied Mathematics, Brown University. May 12, 2017.
  94. Applied and Computational Math Seminar. George Mason University, Fairfax, VA. April 28, 2017.
  95. Finite Element Circus. Rutgers University. April 21-22, 2017.
  96. Minisymposium speaker: SIAM-SEAS, Florida State University, March 18-19, 2017.

97. Minisymposium speaker: Free-boundary Fluid Models and Related Problems. AMS Spring Southeastern Section Meeting. College of Charleston. Charleston, SC, March 10-12, 2017.
98. Minisymposium speaker: Recent Trends in Finite Element Methods. AMS Spring Southeastern Section Meeting. College of Charleston. Charleston, SC, March 10-12, 2017.
99. Minisymposium speaker: Stochastic PDE-Constrained Optimization and Applications. SIAM CS & E. February 27 - March 3, 2017. Atlanta, Georgia.
100. Differential equations seminar speaker, Department of Mathematics, North Carolina State University. April 12, 2017.
101. **Mathematisches Forschungsinstitut Oberwolfach.** Emerging Developments in Interfaces and Free Boundaries. Oberwolfach, Germany. January 22-28, 2017.
102. Colloquium speaker, Department of Mathematics, University of Marburg, Marburg, Germany. January 18, 2017.
- 2016**
103. Numerical Analysis and PDE Seminar speaker, University of Delaware, December 1, 2016.
104. Minisymposium speaker: Control, Optimization, and Differential Games. North Carolina State University, Raleigh, NC. November 12-13, 2016.
105. Finite Element Circus, Worcester Polytechnic Institute, October 14-15, 2016.
106. Invited talk at workshop on Simulation and Optimization of Extreme Fluids. Heidelberg University, Germany. October 10-12, 2016.
107. **Distinguished speaker.** Algorithmic Optimization (ALOP) Colloquium, Department of Mathematics, University of Trier. Trier, Germany. October 5, 2016.
108. Minisymposium speaker. SIAM Conference on Mathematics for Planet Earth. Philadelphia, Pennsylvania, USA. September 30 - October 2, 2016.
109. Minisymposium speaker. The Fifth International Conference on Continuous Optimization (ICCOPT). Tokyo, Japan. August 8-11, 2016.
110. Minisymposium speaker. Recent Advances in Finite Element Methods for Nonlinear PDEs. SIAM Annual Meeting, Boston. July 11-14, 2016.
111. **Tutorial speaker.** Frontiers in PDE constrained optimization. IMA, Minneapolis. June 6-10, 2016.
112. Invited speaker at DelMar Numerics Day, Annual Workshop on Computational Mathematics, George Mason University, Fairfax, VA, May 14, 2015.
113. Seminar speaker. Computational Science Seminars. Department of Mathematics, University of Massachusetts Dartmouth, North Dartmouth, MA. May 3, 2016.
114. Finite element circus, University of Maryland, College Park, MD. April 15-16, 2016.
115. Applied Math Seminar speaker at Technische Universität München, Germany. April 13, 2016.
116. Minisymposium speaker. SIAM Conference on Uncertainty Quantification. April 5-8, 2016. EPFL, Lausanne, Switzerland.
117. Colloquium speaker at Weierstrass Institute, Berlin, Germany, March 2, 2016.
118. Colloquium, Department of Mathematics and Statistics, UNC Charlotte. February 12, 2016.
119. Numerical Analysis Seminar at the University of Maryland, College Park. February 9, 2016.

120. **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>
121. Colloquium speaker at Department of Mathematics, Iowa State University January 26, 2015.
122. Seminar speaker at Department of Mathematics, North Carolina State University January 22, 2015.
123. Minisymposium speaker. Advances in Finite and Boundary Elements. WONAPDE 2016, Chile, January 11-15, 2016.
124. Minisymposium speaker. Computational Electromagnetism. WONAPDE 2016, Chile, January 11-15, 2016.
- 2015**
125. Colloquium speaker at Naval Research Labs (NRL). December 15, 2015.
126. Computational/Applied Math Seminar, Department of Mathematics, University of Tennessee, October 28, 2015.
127. Minisymposium speaker. Advances in Numerical Methods for PDEs with Applications. SIAM PDE, Scottsdale Arizona. December 7-10, 2015.
128. Applied and Computational Math Seminar. George Mason University, Fairfax, VA. September 11, 2015.
129. Colloquium speaker at Department of Mathematics, Humboldt Universität Zu Berlin, Germany, July 2015.
130. Minisymposium speaker. The International Symposium on Optimization (ISMP) 2015. Carnegie Mellon University and University of Pittsburgh. July 12-17, 2015.
131. **Summer School Teacher.** Ciudad Real Numerica 2015. Topic: Numerical Methods for Optimal Control Problems. Ciudad Real, Spain. June 29-July 2, 2015.
132. Invited lecture at EXTREEMS Undergraduate Research Program. George Mason University, Fairfax, Virginia. May 20, 2015.
133. Invited speaker at DelMar Numerics Day, Annual Workshop on Computational Mathematics, United State Naval Academy, Annapolis, May 9, 2015.
134. PDE Seminar speaker at George Mason University, Fairfax, Virginia. April 27, 2015.
135. Finite element circus, George Mason University, Fairfax, Virginia. March 27-28, 2015.
136. Minisymposium speaker. Reduced-order Models for PDE-constrained Optimization Problems. SIAM Conference on Computational Science and Engineering. March 14-18, 2015.
137. Applied Math Seminar speaker at Technische Universität München, Germany. March 12, 2015.
138. Invited speaker at Workshop on Numerical Methods for Optimal Control and Inverse Problems. Technische Universität München, Germany. March 9-11, 2015.
139. Scientific Computing Seminar at Division of Applied Mathematics, Brown University. February 6, 2015.
140. Differential Equation Seminar speaker at Department of Mathematics, University of Maryland, Baltimore County. February 2, 2015.
141. Applied Math Seminar speaker at Sandia National Laboratories - Livermore, CA. January 13, 2015.
- 2014**
142. Minisymposium speaker. Title: Geometric Discretization Methods and Adaptivity. CMS Winter Meeting, Hamilton, Ontario. December 5-8, 2014.

143. Finite element circus, IMA University of Minnesota, October 24-25, 2014.
144. **Plenary speaker** at Modeling, Analysis and Computing in Nonlinear PDEs. Chateau Liblice, Prague, Czech Republic. September 21-26, 2014.
145. Minisymposium speaker. Title: Complex fluids. SIAM annual meeting, July 7-11, 2014.
146. Minisymposium speaker. Title: Model reduction: new trends and recent advances. International conference on spectral and higher order methods. June 23-27, 2014.
147. Colloquium speaker at Department of Mathematics, Humboldt Universität Zu Berlin, Germany, June 11, 2014.
148. Minisymposium speaker. Title: Nonsmooth PDE-constrained optimization. SIAM conference on optimization. May 19-22, 2014.
149. Invited speaker at DelMar Numerics Day, Annual Workshop on Computational Mathematics, University of Maryland, Baltimore County, May 10, 2014.
150. Minisymposium speaker. Title: Advanced Applications of Finite Element Methods. SIAM Seas, March 28-30, 2014.
151. Finite element rodeo, University of Texas, Austin, Texas, February 28 - March 1, 2014.
152. Colloquium, Department of Mathematics, James Madison University, January 27, 2014.
- 2013**
153. AG-Seminar Optimierung, Department of Mathematics, TU Darmstadt, Germany, December 17, 2013.
154. Applied and Computational Mathematics Division Seminar Series at the National Institute of Standards and Technology (NIST), December 2, 2013.
155. Colloquium, Department of Mathematics, University of Tennessee, November 22, 2013.
156. Computational/Applied Math Seminar, Department of Mathematics, University of Tennessee, November 20, 2013.
157. Finite element circus, University of Delaware, Newark, Delaware, October 18-19, 2013.
158. Computational Math Seminar, University of Pittsburgh, September 24, 2013.
159. **Plenary speaker** at Domain Decomposition Methods for Optimization with PDE Constraints. Ascona, Switzerland, September 1-6, 2013.
160. A Stokes Free Boundary Problem with Surface Tension Effects. ENUMATH, Switzerland, August 26-30, 2013.
161. A Stokes Free Boundary Problem with Surface Tension Effects. ICCOPT, Portugal, July 27 - August 1, 2013.
162. A Stokes Free Boundary Problem with Surface Tension Effects. Numerical Approximation of PDEs, Italy March 20-21, 2013.
163. Two-step Greedy Algorithm for Reduced Order Quadratures. SIAM Conference on Computational Science and Engineering, Boston February 25-March 1, 2013.
164. Two-step Greedy Algorithm for Reduced Order Quadratures. WONAPDE 2013, Chile, January 14-18, 2013.
165. Optimal Control of a Free Boundary Problem with Surface Tension Effects. WONAPDE 2013, Chile, January 14-18, 2013.

**2012**

166. Optimal Control of a Free Boundary Problem with Second Order Sufficient Conditions. **Mathematisches Forschungsinstitut Oberwolfach**, Germany, November 25-December 1, 2012.
167. Optimal Control of a Free Boundary Problem with Surface Tension Effects. United State Naval Academy, Annapolis, November 7, 2012.
168. Optimal Control of a Free Boundary Problem with Surface Tension Effects. Louisiana State University, November 6, 2012.
169. Optimal Control of a Free Boundary Problem. Finite Element Circus, October 2012, University of Pittsburgh, Pittsburgh.
170. Finite Element Methods for Linear and Nonlinear PDEs. REU, George Mason University, July 18, 2012.
171. Optimization and Model Reduction of PDE-Constrained Problems. Humboldt Universität Zu Berlin, June 27, 2012.
172. Application-Specific, Fast, High Accuracy Reduced Order Quadratures with Application to Gravitational Waves. Delaware Maryland Numerics Day (DelMar), University of Delaware, April 28, 2012.
173. Application-Specific, Fast, High Accuracy Reduced Order Quadratures. SIAM Conference on Uncertainty Quantification, Raleigh, North Carolina, April 4, 2012.
174. Optimal Control of a Free Boundary Problem with Second Order Sufficient Optimality Conditions. SIAM, SEAS, University of Alabama, Huntsville, March 24-25, 2012.
175. Optimal Control of a Free Boundary Problem with Second Order Sufficient Optimality Conditions. Numerical Analysis and PDE Seminar, University of Delaware, March 15, 2012.
176. Application-Specific, Fast, High Accuracy Reduced Order Quadratures. Texas Finite Element Rodeo, February 2012, Rice University, Houston, Tx.
177. Reduced Order Modeling for Parametric Nonlinear PDE Constrained Optimization Problems. Scientific Computing Seminar, George Mason University, January 27, 2012.
178. Reduced Order Modeling for Parametric Nonlinear PDE Constrained Optimization Problems. Computational and Applied Mathematics Colloquium, Penn State University, January 20, 2012.
179. Optimal Control of a Free Boundary Problem with Second Order Sufficient Optimality Conditions. CCMA Luncheon Seminar, Penn State University, January 20, 2012.
- 2011**
180. 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.
181. Optimal Control of a Free Boundary Problem with Second Order Sufficient Optimality Conditions. ICIAM, Vancouver, July 18-22, 2011.
182. Reduced Order Modeling for Parametric Nonlinear PDEs Using POD-DEIM. ICIAM. Vancouver, July 18-22, 2011.
183. Reduced Order Modeling for Parametric Nonlinear PDE Constrained Optimization Problems. Texas Finite Element Rodeo, February 2011, Texas A & M, College Station.
184. Reduced Order Modeling for Parametric Nonlinear PDE Constrained Optimization Problems. Schlumberger Oilfield Services, Sugar Land, Tx, Feb 24, 2011.
- 2010**
185. Reduced Order Modeling for Parametric Nonlinear PDEs Using POD-DEIM. Scientific Computing Seminar, University of Houston, November 11, 2010.

- 186. Reduced Order Modeling for Parametric Nonlinear PDEs Using POD-DEIM. Scientific Computing and Numerical Analysis Seminar, Rice University, October 20, 2010.
- 187. 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.
- 188. 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.
- 189. Reduced Order Modeling Based Shape Optimization of Time Dependent PDE-Constrained Optimization Problems. Numerical Analysis Seminar, University of Maryland, March 9, 2010.
- 190. Model Reduction and Shape Optimization of Microfluidic Biochips. Texas Finite Element Rodeo, February 2010, SMU, Dallas.
- 191. Optimization and Model Reduction of Time Dependent PDE-Constrained Optimization Problems. Sandia National Laboratories, Albuquerque, New Mexico, January 11, 2010.

**2009**

- 192. 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.
- 193. Domain Decomposition and Model Reduction for Shape Optimization Problems. Texas Finite Element Rodeo, March 2009, ICES University of Texas, Austin.
- 194. 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**

- 195. Electro-Magnetic Logging in 3D Anisotropic Media Using an Efficient FD Scheme, June 2008, University of Augsburg, Germany.
- 196. Primal-Dual Interior-Point Methods for Shape Optimization Problems. Texas Student SIAM Conference, 2008, Rice University.

**2007**

- 197. 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.
- 198. Path-following Primal-Dual Interior-Point Methods for Shape Optimization in Stationary Flow Problems. Texas Finite Element Rodeo March 2007, University of Houston.