

Weiwei Hu

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EMPLOYMENT

- 08/2021–present, Associate Professor, Department of Mathematics, University of Georgia, Athens, GA.
- 08/2019–07/2021, Assistant Professor, Department of Mathematics, University of Georgia, Athens, GA.
- 08/2016–07/2019, Assistant Professor, Department of Mathematics, Oklahoma State University, Stillwater, OK.
- 08/2015–08/2016, Postdoctoral Fellow, Institute for Mathematics and its Applications (IMA), University of Minnesota, Minneapolis, MN.
- 08/2012–05/2015, Assistant Professor (Non-Tenure-Track), Department of Mathematics, University of Southern California, Los Angeles, CA.

EDUCATION

- 2012: Ph.D., Mathematics, Virginia Tech, Blacksburg, Virginia, USA.
- 2011: M.S., Mathematics, Virginia Tech, Blacksburg, Virginia, USA.
- 2007: M.E., Systems Engineering, Beijing Institute of Information and Control, Beijing, China.
- 2003: B.A., Mathematics, Chengdu University of Technology, Chengdu, China.

RESEARCH INTERESTS

- Mathematical control theory of partial differential equations
- Control of transport and mixing via fluid flows
- Well-posedness and long-time behavior of mathematical fluid dynamics
- Data-driven optimal control and estimation of network dynamics
- Computational methods for control designs and model reduction
- Parameter identification and reliability analysis of renewable systems

PUBLICATIONS

Peer-reviewed Journals

(The authors with * are/were graduate students while the work was conducted.)

1. W. Hu, C. N. Rautenburg and X. Zheng, Feedback Control for Fluid Mixing via Advection, *Journal of Differential Equations*, 374, 2023. 126–153.

2. W. Hu, Global regularity and stability analysis of the Patlak-Keller-Segel system with flow advection in a bounded domain: a semigroup approach. *Nonlinear Analysis*, Vol. 234, Sep. 2023, 113319. <https://doi.org/10.1016/j.na.2023.113319>.
3. A. N. Ceretani, W. Hu, and C. Rautenburg, Optimal Conduit Shape for Stokes Flow, *System & Control Letter*, Vol. 173, Mar. 2023, 105461. <https://doi.org/10.1016/j.sysconle.2023.105461>.
4. W. Hu, J. Liu and Z. Wang, Bilinear Control of Convection-Cooling and Computation: From Open-Loop to Closed-Loop, *Applied Mathematics & Optimization*, 86(5), 2022. <https://doi.org/10.1007/s00245-022-09876-x>.
5. S. Afshar and W. Hu, Permeability Estimation of a Porous Structure based on Sampled Velocity Measurements, *Inverse Problems*, 38(6), 065002, 2022.
6. W. Hu and J. Liu, Optimal Bilinear Control of a Repairable Multi-State System, *International Journal of Control*, 95:4, 851-866, 2022. DOI: 10.1080/00207179.2020.1825819.
7. K. Huhtala*, L. Paunonen, and W. Hu, Robust output regulation of the linearized Boussinesq equations with boundary control and observation, *Mathematics of Control, Signals, and Systems*, 34, 361–391, 2022.
8. W. Hu, M. A. Demetriou, X. Tian, N. A. Gatsonis, Hybrid Domain Decomposition Filters for Advection-Diffusion PDEs with Mobile Sensors, *Automatica*, Vol. 138, April 2022, 110109. <https://doi.org/10.1016/j.automatica.2021.110109>.
9. C. He, W. Hu and L. Mu, Optimal Control of Convection-Cooling via Flow Advection and Numerical Implementation, *Computers and Mathematics with Applications*, 92 (2021), 48-61.
10. W. Gong, W. Hu, M. Mateos, J. Singler, and Y. Zhang*, Analysis of an hybridizable discontinuous Galerkin scheme for the tangential control of the Stokes system, *ESAIM: Mathematical Modelling and Numerical Analysis*, 54(2020), 2229–2264. DOI: 10.1051/m2an/2020015.
11. Y. Dai*, W. Hu, J. Wu and B. Xiao*, The Littlewood-Paley Decomposition for Periodic Functions and Applications to the Boussinesq Equations, *Analysis and Applications*, 18 (4), 2020, 639–682.
12. W. Hu, J. Shen*, J. Singler, Y. Zhang*, and X. Zheng, A Superconvergent Hybridizable Discontinuous Galerkin Method for Dirichlet Boundary Control of Elliptic PDEs, *Numerische Mathematik*, 144(2), 375–411, 2020.
13. W. Hu, An Approximating Control Design for Optimal Mixing by Stokes Flows, *Applied Mathematics & Optimization*, 82, 2020, 471–498. <https://doi.org/10.1007/s00245-018-9535-4>.
14. W. Hu and J. Wu, An Approximating Approach for Boundary Control of Optimal Mixing via Navier-Stokes Flows, *Journal of Differential Equations*, 267(10), 2019, 5809–5850.
15. W. Hu and J. Wu, Boundary Control for Optimal Mixing via Navier-Stokes Flows, *SIAM Journal on Control and Optimization*, 56(4), 2018, 2768–2801.
16. W. Hu, Boundary Control for Optimal Mixing by Stokes Flows, *Applied Mathematics & Optimization*, 78(1), 2018, 201–217.
17. W. Gong, W. Hu, M. Mateos, J. Singler, X. Zhang*, and Y. Zhang*, A New HDG Method for Dirichlet Boundary Control of Convection Diffusion PDEs II: Low Regularity, *SIAM Journal on Numerical Analysis*, 56(4), 2018, 2262–2287.

18. W. Hu, J. Shen, J. Singler, Y. Zhang*, and X. Zheng*, A Superconvergent HDG Method for Distributed Control of Convection Diffusion PDEs, *Journal of Scientific Computing*, 2018, 76:1436–1457.
19. G. Chen, W. Hu, J. Shen*, J. Singler, Y. Zhang*, and X. Zheng*, An HDG Method for Distributed Control of Convection Diffusion PDEs, *Journal of Computational and Applied Mathematics*, 343, 2018, 643–661.
20. X. He, W. Hu and Y. Zhang*, Observer-based Feedback Stabilization of Navier-Stokes Equations, *Computer Methods in Applied Mechanics and Engineering*, 339(1), 2018, 542–566.
21. W. Hu, Y. Wang, J. Wu, B. Xiao* and J. Yuan, Partially Dissipated 2D Boussinesq Equations with Navier Type Boundary Conditions, *Physica D: Nonlinear Phenomena*, 376–377(1), 2018, 39–48.
22. J. Burns, X. He, and W. Hu, Feedback Stabilization of a Thermal Fluid System with Mixed Boundary Control, *Computers & Mathematics with Applications*, 71(11), 2016, 2170–2191.
23. W. Hu, Differentiability and Compactness of the C_0 -Semigroup Generated by the Repairable System with Finite Repair Time, *Journal of Mathematical Analysis and Applications*, 433(2), 2016, 1614–1625.
24. W. Hu, I. Kukavica and M. Ziane, Sur l'existence locale pour une quation de scalaires actifs. (French) [Local Existence for an Active Scalar Equation], *Comptes Rendus Mathematique*, 353(3), 2015, 241–245.
25. W. Hu, I. Kukavica and M. Ziane, Persistence of Regularity for the Viscous Boussinesq Equations with Zero Diffusivity, *Asymptotic Analysis*, 91, 2015, 111–124.
26. W. Hu, I. Kukavica, and M. Ziane, On the Regularity for the Boussinesq Equations in a Bounded Domain, *Journal of Mathematical Physics*, 54, 081507, 2013.
27. H. B. Xu and W. Hu, Analysis and Approximation of a Reliable Model, *Applied Mathematical Modelling*, 37(6), 2013, 3777–3788.
28. H. B. Xu and W. Hu, Modelling and Analysis of Repairable Systems with Preventive Maintenance, *Applied Mathematics and Computation*, 224, 2013, 46–53.
29. H. B. Xu and W. Hu, Availability Optimization of Repairable System with Preventive Maintenance Policy, *International Journal of Systems Science*, 39(6), 2008, 655–664.
30. W. Hu, Y. H. Xin, and G. T. Zhu, Irreducibility of the Positive Contraction C_0 -semigroup Generated by $M/G/1$ Queueing Operator, *Acta Functionalis Applicata*, 10(4), 2008, 378–382.
31. Y. H. Xin, A. H. Zheng, and W. Hu, Well-Posedness and Analysis of a Reliability Model for a Supply Chain, *Mathematics in Practice and Theory*, 38(10), 2008, 46–52.
32. W. Hu, Z. F. Shen, Y. H. Xin, and G. T. Zhu, Exponential Stability of a Repairable System with Imperfect Switching Mechanism, *Asymptotic Analysis*, 54(1), 2007, 93–102.
33. W. Hu, H. B. Xu, J. Y. Yu, and G. T. Zhu, Exponential Stability of a Repairable Multi-state Device, *Journal of Systems Science & Complexity*, 20(3), 2007, 437–443.
34. W. Hu, H. B. Xu, and G. T. Zhu, Exponential Stability of a Parallel Repairable System with Warm Standby, *Acta Functionalis Applicata*, 9(4), 2007, 311–319.
35. C. Xie, C. Yao, and W. Hu, Eigenvalue Sorting Problem in Flutter Analysis, *Mathematics in Practice and Theory*, 37(18), 2007, 141–146.

36. W. Hu, Asymptotic Stability of a Parallel Repairable System with Warm Standby under Common-cause Failure, *Acta Functionalis Applicata*, 8(1), 2006, 1–11.
37. W. Hu, Y. B. Zhang, and W. Y. Yang, Scrambling Research of Digital Image Based on IFS and Code Space, *Mathematics in Practice and Theory*, 34(3), 2004, 91–97.

Book Chapter

1. W. Hu, I. Kukavica, F. Wang, and M. Ziane, Boussinesq Equations with Zero Viscosity or Zero Diffusivity: a Review, *Recent Progress in the Theory of the Euler and Navier-Stokes Equations*, London Mathematical Society Lecture Note Series, 430. Cambridge University Press, 2016, 77–95.

Peer-reviewed Conference Proceedings

1. W. Hu, A. Tepper*, Q. Zhang, B. Xie, Deep Learning for Failure Rate Identification of a Repairable System Governed by Coupled ODE-PDEs, *Proceedings of 2023 American Control Conference (ACC)*, 2023, pp. 961–966.
2. M. Demetriou, W. Hu, Sensor location for unknown input observers of second order infinite dimensional systems, *Proceedings of 61th IEEE Conference on Decision and Control (CDC)*, Cancun, Mexico, 2022, pp. 6724–6729, doi: 10.1109/CDC51059.2022.9992554.
3. M. Demetriou, W. Hu, Using mobile sensor density to approximate state feedback controllers for a class of PDEs, *IFAC-PapersOnLine* 55(26), 2022, 125–130.
4. M. Demetriou and W. Hu, Finite Dimensional Functional Observer Design for Parabolic Systems, *Proceedings of 60th IEEE Conference on Decision and Control (CDC)*, 2021, pp. 1155–1160, doi: 10.1109/CDC45484.2021.9682848.
5. M. Demetriou and W. Hu, Design and optimization of reduced-order compensators of distributed parameter systems via functional observers and unknown input functional observers, *Proceedings of 2021 European Control Conference (ECC)*, 2021, pp. 2518–2523, doi: 10.23919/ECC54610.2021.9654879.
6. W. Hu and J. Liu, Sampled-data based Failure Rate Identification for a Multi-state Repairable System, *Proceedings of 59th IEEE Conference on Decision and Control (CDC)*, Jeju Island, Korea (South), 2020, 4442–4447, doi: 10.1109/CDC42340.2020.9304058.
7. K. Huhtala*, L. Paunonen, and W. Hu, Robust Output Tracking for a Room Temperature Model with Distributed Control and Observation, *Proceedings of the 24th International Symposium on Mathematical Theory of Networks and Systems (MTNS)*, 54(9), 2020, 462–467.
8. M. Demetriou and W. Hu, Feedback Kernel Approximations and Sensor Selection for Controlled 2D Parabolic PDEs Using Computational Geometry Methods, *Proceedings of the 58th IEEE Conference on Decision and Control*, 2019, 2144–2150.
9. N. Boardman*, W. Hu and R. Mishra*, Optimal Maintenance Design for a Simple Repairable System, *Proceedings of the 58th IEEE Conference on Decision and Control*, 2019, 3098–3103.
10. W. Hu and M. Demetriou, Domain Decomposition Methods for the State Estimation of Parabolic PDEs in 2D Rectangular Domains: Well-posedness and Convergence, *Proceedings of the 2019 European Control Conference*, 2019, 1920–1925.
11. M. Demetriou and W. Hu, Hybrid Domain Decomposition Filters for Parabolic Spatially Distributed Processes, *Proceedings of the 2019 American Control Conference*, 2019, 2552–2557.

12. W. Hu and O. San, Optimal Control of Heat Transfer in Unsteady Stokes Flows, *Proceedings of the 57th IEEE Conference on Decision and Control*, 2018, 3752–3757 (nominated for the 2019 Roberto Tempo Best CDC Paper Award).
13. V. Trenchant*, W. Hu, H. Ramirez, and Y.-L. Gorrec, Structure Preserving Finite Difference in Polar Coordinates for Heat and Wave Equations, *Proceedings of the 9th Vienna International Conference on Mathematical Modelling*. IFAC PapersOnLine, 51(2), 2018, 571–576.
14. W. Hu, Enhancement of Heat Transfer in Stokes Flows, *Proceedings of the 56th IEEE Conference on Decision and Control*, 2017, 59–63.
15. W. Hu and S. Z. Khong, Optimal Control Design for a Repairable Multi-State System, *Proceedings of the 2017 American Control Conference*, 2017, 3183–3188.
16. W. Hu, K. Morris and Y. Zhang*, Sensor Location in a Controlled Thermal Fluid, *Proceedings of the 55th IEEE Conference on Decision and Control*, 2016, 2259–2264.
17. W. Hu, J. Singler and Y. Zhang*, Feedback Control of a Thermal Fluid Based on a Reduced Order Observer, *Proceedings of the 10th IFAC Symposium on Nonlinear Control Systems*, 2016, 116–121.
18. F. Wei*, C. Zheng and W. Hu, Controllability of a Simplified Repairable System, *Proceedings of the 31st Youth Academic Annual Conference of Chinese Association of Automation*, 2016, 146–151.
19. W. Hu and J. Singler, A Modified Balanced POD Model Reduction Algorithm for Parabolic PDEs with Unbounded Inputs, *Proceedings of 2014 American Control Conference*, 2014, 1680–1685.
20. I. G. Rosen, C. M. Wang, W. Hu, M. Hankin*, R. Lai, M. E. Thompson, and S. R. Forrest, Estimation of Parameters in a Distributed Parameter Model for Thin Film Layered Organic Photovoltaic Cells, *Proceedings of 2014 American Control Conference*, 2014, 1039–1044.
21. I. G. Rosen, S. E. Luczak, W. Hu, and M. Hankin*, Discrete-Time Blind Deconvolution for Distributed Parameter Systems with Dirichlet Boundary Input and Unbounded Output with Application to a Transdermal Alcohol Biosensor, *Proceedings of the SIAM Conference on Control and Its Applications*, 2013, 160–167.
22. J. A. Burns and W. Hu, Approximation Methods for Boundary Control of the Boussinesq Equations, *Proceedings of the 52nd IEEE Conference on Decision and Control*, 2013, 454–459.
23. W. Hu and H. B. Xu, Numerical Analysis of a Repairable Multi-State Device, *Proceedings of the Asian Control Conference*, 2013, 1–5.
24. J. Burns, X. He, and W. Hu, Control of the Boussinesq Equations with Implications for Sensor Location in Energy Efficient Buildings, *Proceedings of the 2012 American Control Conference*, 2012, 2232–2237.
25. C. Xie and W. Hu, Post Process Research of Data in Flutter Analysis, in *Proceedings of the 9th Chinese National Aeroelasticity Conference*, 2005, 209–214.

ARTICLES SUBMITTED & PREPRINTS

1. W. Hu, M.-J. Lai, and J. Lee*, Optimal control for suppression of singularity in chemotaxis, submitted to *Applied Mathematics & Optimization*.
2. X. Zheng, K. Zhao, J. Wu, W. Hu, and D. Du, Iterative projection method for unsteady Navier-Stokes equations with high Reynolds numbers, submitted to *Journal of Computational Physics*, <https://arxiv.org/abs/2304.07963>.
3. W. Hu and X. Zheng, Optimal Boundary Control of Mixing via Flow Advection and Numerical Implementation, <https://arxiv.org/abs/2108.09533>.
4. X. Zheng, W. Hu and J. Wu, Numerical algorithms and simulations of boundary dynamic control for optimal mixing in unsteady Stokes flows, submitted to *Computer Methods in Applied Mechanics and Engineering*, <http://arxiv.org/abs/2306.10690>.
5. W. Hu, M. Mateos, J. Singler, and Y. Zhang, A New HDG Method for Dirichlet Boundary Control of Convection Diffusion PDEs I: High Regularity. <https://arxiv.org/abs/1801.01461>, 2017.
6. W. Hu, R. Lai, H. B. Xu, and C. Zheng, Optimal Impulse Control of a Simple Repairable System in a Nonflexive Banach Space. <https://arxiv.org/abs/1703.09392>.

IN PREPARATION

1. W. Hu and R. Lai, Control for fluid mixing based on optimal transport approaches.
2. W. Hu, L. Paunonen and David Seifert, Polynomial Stability of Fluid Mixing via Flow Advection.
3. W. Hu and M. Demetriou, Bilinear tracking control of mobile sensor network density using PDE modelling.
4. W. Hu, J. Singler, and Y. Zhang, Optimal Control for Mixing based on a Reduced Order Flow Model.
5. W. Hu, Bilinear Controllability of a Multi-State Repairable System.
6. W. Hu, Optimal control for Heat Transfer Enhancement via the Navier-Stokes Flows, preprint.

HONORS & AWARDS

- 2023–2026, AFOSR, “Hybrid Control and Estimation of Semi-Dissipative Systems: Analysis, Computation, and Machine Learning”, \$442,285 (single PI).
- 2023–2026, NSF, DMS-2229345, “Collaborative Research: AMPS: Deep-Learning-Enabled Distributed Optimization Algorithms for Stochastic Security Constrained Unit Commitment”, \$320,000 (PI at UGA, \$120,000), jointly with Hongyu Wu (PI at Kansas State University), and Ashesh Sinha (Co-PI at Kansas State University).
- 2022–2025, NSF, DMS-2205117, “Nonlinear Control and Observer Designs for Flow-Transport Systems”, \$120,000 (single PI).
- 2021–2024, NSF, DMS-2232526, Supplemental Funding for Research Collaboration in Europe for NSF Awardees, \$9,060 (PI at UGA).
- 2021–2024, NSF, DMS-2111486, “Collaborative Research: Computational Methods for Optimal Transport via Fluid Flows”, \$398,050 (PI at UGA, \$145,597), jointly with John Singler (PI at Missouri S&T), Yangwen Zhang (PI at CMU).

- 2018–2023, NSF, DMS-2005696 (previously DMS-1813570), “Control and Optimization of Semi-Dissipative Systems”, \$108,734 (single PI, no cost extension from 2021 to 2023).
- Interdisciplinary Research Pre-Seed Program on “The Integration of PDE Modeling, Machine Learning and Topology Analysis in MRIs Analysis”, \$3,500, UGA, 2020.
- 2018–2019, DARPA, HR001117S0039-Lagrange-FP-014, “Robust Optimization & Control of Dynamic Sensor Systems” \$749,999 (PI at OSU, \$98,000), jointly with J. Burns (PI at VT), M. Demetriou (PI at WPI), and N. Gatsonis (Co-PI at WPI).
- SQuaRE at AIM on “Optimal mixing and control of heat conductive flows via active and passive approaches”, jointly with Andrea Ceretani, Cuiyu He, Lin Mu, and Carlos N. Rautenberg, June 13-17, 2021 and July 10-14, 2023.
- Visiting professor at the Chair of Computational Mathematics of Fundación Deusto at University of Deusto founded by the European Research Council (ERC), Bilbao, Basque Country, Spain, July 15–31, 2022.
- Visiting professorship at FEMTO-ST, University of Franche-Comté of Besançon, France, June–July, 2019.
- Visiting scholarship at Shanghai Key Laboratory for Contemporary Applied Mathematics, Fudan University, Shanghai, China, June–July, 2018.
- OSU FY 2018 Academic Summer Research + 1 Travel Grant, \$9,223.
- OSU FY 2017–2019 Dean’s Incentive Grant. \$6,000.
- USC Zumberge Individual Research and Innovation Fund Award 2013–2014, \$24,975.
- USC WiSE Merit Award for Excellence in Postdoctoral Research 2012–2013, \$3,000.
- C.B.Ling Scholarship, Virginia Tech, 2010–2011.
- Hatcher Fellowship, Virginia Tech, Summer of 2008–2012.

Travel Awards

- FY23 Provost International Travel Funds, UGA, 2023.
- NSF-ADVANCE Grant 150048, Career Advancement for Women through Research-focused Networks, 2021.
- OSU FY 2019 Fall Travel Grant.
- AWM-NSF Travel Grant for the Banff Workshop on Women in Control: New Trends in Infinite Dimensions, Banff International Research Station, Banff, Alberta, Canada, July, 2017.
- AWM-NSF Travel Grant for the 55th IEEE Conference on Decision and Control, Las Vegas, December 2016.
- SIAM Early Career Travel Award for the 8th International Congress on Industrial and Applied Mathematics (ICIAM15), Beijing, China, August 2015.
- SIAM Early Career Travel Award for SIAM Conference on Control and Its Applications (CT15), Paris, France, July 2015.
- AMS Travel Award for the International Congress of Mathematicians (ICM14), Seoul, Korea, August 2014.
- AMS Travel Award for the Mathematical Congress of the Americas (MCA13), Guanajuato, Mexico, August 2013.

- SIAM Travel Award for the AWM Workshop at SIAM Annual Meeting 2013, San Diego, CA, July 2013.
- SIAM Travel Award for the SIAM Conference on Computational Science and Engineering (CSE13), Boston, MA, March 2013.

PROFESSIONAL MEMBERSHIP

- SIAM, 2010-
- IEEE, 2020-

PRESENTATIONS

- **Invited Speaker**, Conference on Distributed Parameter Systems (CDPS), Tel Aviv and Sde Boker, Israel, Nov. 5–12, 2023.
- Invited talk, Minisymposium on “Control and Estimation of PDEs”, SIAM Conference on Control and Its Applications (SIAM CT23), Philadelphia, Jul. 24-26, 2023.
- Invited talk, RCM, Beijing Normal University and IRADS, BNU-HKBU United International College, May 18, 2023.
- Invited talk, CKSRI Seminar Series 2023, Hong Kong University of Science and Technology, May 15, 2023.
- Mini-workshop talk, “Analysis, Numerics and Control”, Department of Data Science (DDS), Chair in Dynamics, Control and Numerics (Alexander von Humboldt-Professorship), FAU Erlangen-Nuremberg, Germany, May 11, 2023.
- **Invited Lecturer**, 48th Annual Spring Lecture Series on “Transport, Mixing and Fluids”, University of Arkansas, Fayetteville, AR, May 5–7, 2023.
<https://aeb019.hosted.uark.edu/spring-lecture-series-2023.html>
- Invited talk, LSU Zoom Control and Optimization Seminars, Louisiana State University, April 28, 2023.
- **Plenary talk**, BIRS Workshop on “Differential-algebraic Equations and Operator Pencils”, Banff, Alberta, Canada, April 16–21.
<http://www.birs.ca/events/2023/5-day-workshops/23w5056/videos/watch/202304201045-Hu.html>
- Invited talk, Computational Mathematics Seminar, Department of Mathematics, University of Pittsburgh, Pittsburgh, April 11, 2023.
- Invited talk, Controls & Dynamics Seminar, Mechanical & Aerospace Engineering Department, University of California, San Diego, Mar. 17, 2023.
- Invited talk, Applied Math Seminar, Department of Mathematics, University of California, Irvine, Mar. 13, 2023.
- Invited talk, Numerical Analysis Seminar, Department of Mathematics, Institute of Mathematical Research, The University of Hong Kong, Dec. 16, 2022.
- CAMS Colloquium talk, Department of Mathematics, University of Southern California, Nov. 7, 2022.
- Invited talk, “Deterministic and Stochastic PDEs: Theoretical and Numerical Analyses” at the AMS Fall Southeastern Sectional Meeting at University of Tennessee, Chattanooga, Tennessee, Oct. 15–16, 2022.

- Invited talk, Clemson Analysis Seminar, Sep. 26, 2022.
- **Plenary talk**, 4th IFAC Workshop on Control of Systems Governed by Partial Differential Equations (CPDE 2022), Kiel, Germany, Sep. 5–7, 2022.
- DeustoCCM Seminar talk, Chair of Computational Mathematics of Deusto Foundation, University of Deusto, Bilbao, Basque Country, Spain, July 27, 2022.
- Invited talk, Recent Advances in Numerical Algorithms for Phenomena Modeled by PDEs, 2022 SIAM Annual Meeting (virtual), Pittsburg, July 11–15, 2022.
- Contributed talk, ICAM conference/workshop on “Applied and Computational Mathematics”, The Inn at Virginia Tech, Blacksburg, VA, June 1–4, 2022.
- Invited talk, Department of Data Science (DDS), Chair in Dynamics, Control and Numerics (Alexander von Humboldt-Professorship), FAU Erlangen-Nuremberg, Germany, May 19, 2022.
- Invited talk, LAGEPP, Bâtiment CPE, Université Claude Bernard Lyon 1, France, May 12, 2022.
- Invited talk, PDE Seminar, University of Nebraska-Lincoln, Apr. 26, 2022.
- **Invited Speaker**, 2022 Georgia Scientific Computing Symposium, Georgia Tech, Feb. 19, 2022.
- Applied Math Seminar, Department of Mathematics, University of Georgia, Feb. 15, 2022.
- **Invited Speaker**, KUMUNU-ISU Conference on “PDE, Dynamical Systems, and Applications 2020”, University of Nebraska-Lincoln, Oct. 23–34, 2021.
- **Plenary talk**, 3rd Workshop on “Stability and Control of Infinite-Dimensional Systems (SCINDIS 2020)”, Wuppertal, Germany, September 27–29, 2021 (virtual).
- Invited talk, Minisymposium on “Modeling and Numerical Methods for Coupled PDE Systems” at SIAM SEAS2021, Sep. 18–19, 2021 (virtual).
- Invited talks, Minisymposia on “Qualitative and Quantitative Analysis of Nonlinear Evolutionary Partial Differential Equations” and “Navier-Stokes equations with mixed boundary conditions and related problems” at the 29th IFIP TC7 Conference on System Modelling and Optimization, Aug. 30–Sep. 3, 2021 (virtual).
- Invited talk, Minisymposium on “Estimation and Control of PDE Systems”, July 19–21, SIAM Conference on Control and Its Applications (CT21) (virtual).
- Invited talk, AWM Workshop on “Control and Optimization in Differential Equations”, July 19–21, SIAM Annual Meeting AN 21 (virtual).
- Invited talk, Mini-Workshop on “Mathematics of Dissipation–Dynamics, Data and Control” (hybrid meeting), the Mathematisches Forschungsinstitut Oberwolfach, Germany, May 9–15, 2021.
- Colloquium, University of Georgia, Athens, GA, March 11 2021.
- Distributed Parameter System (DPS) Online Seminar via Zoom, Feb. 23, 2021.
- Applied Math Seminar, University of Georgia, Athens, GA, Oct. 28, 2020.
- Invited talk, Minisymposium on “Recent Advances in the Control of Partial Differential Equations” (virtual), 2nd Joint SIAM-CAIMS Annual Meeting, Toronto, Ontario, Canada, July 6–17, 2020 (postponed due to COVID).

- Invited talk, 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications, June, 2020, Atlanta, USA (postponed due to COVID).
- Invited talk, Applied and Computational Math Seminar, Department of Mathematical Science, George Mason University, March 6, 2020.
- Invited talk, Minisymposium on “Estimation and Control of PDE Systems”, 58th IEEE Conference on Decision and Control, Nice, France, December 11–13, 2019.
- Invited talk, Applied and Computational Math Seminar, School of Mathematics, Georgia Tech, November 11, 2019.
- Invited talk, Department of Mathematical Science, University of Delaware, October 24, 2019.
- Applied Math Seminar talk, Department of Mathematics, University of Georgia, October 1, 2019.
- Invited talk, Minisymposium on “Classical and Geophysical Fluid Dynamics: Modeling, Reduction and Simulation”, AMS Fall Central Sectional Meeting, Madison, WI, September 14–15, 2019.
- Invited talk, Academy of Mathematics and Systems Science, Chinese Academy of China, Beijing, China, July 24, 2019.
- Minisymposium talk on “Recent Advances in Control, Optimization, and Numerical Methods for Infinite Dimensional Systems”, ICIAM, Valencia, Spain, July 15–19, 2019.
- Invited talk, Workshop on “Incompressible Fluid Mechanics Equations”, Chengdu, China, June 15–16, 2019.
- Invited talk, Minisymposium on “Optimal Control of Parabolic and Elliptic PDEs”, 2019 SIAM Conference on Control and Its Applications, Chengdu, China, June 19–21, 2019.
- Invited session talk, 3rd IFAC/IEEE CSS Workshop on Control of Systems Governed by Partial Differential Equations (CPDE 2019) and XI Workshop on Control of Distributed Parameter Systems (CDPS 2019), Oaxaca, Mexico, May 20–24, 2019.
- Invited talk, Department of Applied Mathematics, University of California, San Jose, CA, May 6, 2019.
- Invited talk, Women in Control, AWM Research Symposium, Rice University, Houston, TX, April 6–7, 2019.
- Invited talk, Department of Mathematics and Statistics, Queen’s University, Kingston, ON, Canada, February 13, 2019.
- Invited talk, Department of Mathematical Sciences, University of Cincinnati, OH, January 25, 2019.
- Invited talk, Department of Applied Mathematics, University of Waterloo, Waterloo, ON, Canada, January 17, 2019.
- Invited talk, Department of Mathematics, Chengdu University of Technology, Chengdu, China, December 28, 2018.
- Invited talk, Academy of Mathematics and Systems Science, Chinese Academy of China, Beijing, China, December 26, 2018.
- Invited talk, Minisymposium on “Distributed Parameter Systems”, 57th IEEE Conference on Decision and Control, Miami, December 17–19, 2018.

- Invited talk, Colloquium, Department of Mathematics, University of Georgia, Athens, GA, December 7, 2018.
- Invited talk, a special session on “Recent Developments in Mathematical Analysis of Some Nonlinear Partial Differential Equations”, AMS Sectional Meeting, University of Michigan, Ann Arbor, Michigan, October 20–21, 2018.
- Invited talk, Minisymposium on “Partial Differential Equations in Mathematical Fluid Mechanics”, the 4th Annual Meeting of SIAM Central States Section, University of Oklahoma, Norman, Oklahoma, October 5–7, 2018.
- Invited talk, Minisymposium on “Control of Infinite-dimensional Systems”, 23rd International Symposium on Mathematical Theory of Networks and Systems (MTNS), The Hong Kong University of Science and Technology, Hong Kong, July 16–20, 2018.
- Invited talk, School of Mathematical Sciences, Zhejiang University, Hangzhou, China, June 14–18, 2018.
- Invited talk, Shanghai Key Laboratory for Contemporary Applied Mathematics, Fudan University, Shanghai, China, June 20, 2018.
- Invited talk, DE/Nonlinear Analysis Seminar, Department of Mathematics, NC State University, Raleigh, NC, March 13–17, 2018.
- Invited talk, CAMS Colloquium, Department of Mathematics, University of Southern California, Los Angeles, CA, February 04–06, 2018.
- Invited talk, Minisymposium on “Estimation and Control of Distributed Parameter Systems”, 56th IEEE Conference on Decision and Control, Melbourne, December 12–15, 2017.
- Invited talk, Women in Control: New Trends in Infinite Dimensions, Banff International Research Station, Banff, Alberta, Canada, July 16–21, 2017.
<http://www.birs.ca/events/2017/5-day-workshops/17w5123/videos/watch/201707201000-Hu.html>
- Invited talk, SIAM Conference on Control and its Applications (CT17), Pittsburgh, PA, July 10–12, 2017.
- Invited talk, Conference on Classical and Geophysical Fluid Dynamics: Modeling, Reduction and Simulation. Virginia Tech, Blacksburg, Virginia, June 26–28, 2017.
- Invited talk, Seminar on Repairable Systems: Optimal Control and Simulation. Beijing Institute of Technology, Beijing, June 1, 2017.
- Invited talk, Minisymposium on Estimation and Control of DPS, 2017 American Control Conference, Seattle, Washington, May 24–26, 2017.
- Invited talk, Department of Mathematics, Beijing Institute of Technology, Beijing, December 19, 2016.
- Invited talk, Minisymposium on Estimation and Control of Distributed Parameter Systems, 55th IEEE Conference on Decision and Control, Las Vegas, December 12–14, 2016.
- Contributed talk, 2nd SIAM Central States Section conference, Little Rock, AR, September 30–October 2, 2016.
- Colloquium talk, Department of Mathematics, Oklahoma State University, Stillwater, OK, October 7, 2016
- Invited talk, 10th IFAC Symposium on Nonlinear Control Systems, Monterey, CA, August 23–25, 2016.

- Contributed talk, 22nd International Symposium on Mathematical Theory of Networks and Systems (MTNS), Minneapolis, July 12–15, 2016.
- Invited talk, Sino-French Conference on Applied Mathematics (SFCAM), Bordeaux, France, May 23–36, 2016.
- Postdoc seminar talk at IMA, University of Minnesota, April 2016.
- Invited talk, Department of Applied Mathematics & Statistics, Johns Hopkins University, February 16, 2016.
- Invited talk, Department of Applied Mathematics, University of Washington, Seattle, February 11, 2016.
- Colloquium talk, Department of Mathematics, Oklahoma State University, Stillwater, January 22, 2016.
- Invited talk, Department of Mathematics, South University of Science and Technology of China, Shenzhen, December 7, 2015.
- Invited talk, Mitsubishi Electric Research Laboratories (MERL), Boston, November 2015.
- Invited talk, Mini-Workshop on Recent Developments on Approximation Methods for Controlled Evolution Equations at the Mathematisches Forschungsinstitut Oberwolfach, Germany, organized by Birgit Jacob, Enrique Zuazua and Hans Zwart, November 2015.
- Poster presentation, 8th International Congress on Industrial and Applied Mathematics (ICIAM), Beijing, China, August 2015.
- Invited talk, Mini-symposium on Optimal Actuator/Sensor Location for Distributed Parameter Systems, SIAM Conference on Control & Its Applications, Paris, France, July 2015.
- Colloquium talk, Department of Mathematics, Missouri University of Science and Technology, Rolla, MO, May 2015.
- Colloquium talk, Department of Mathematics, New Mexico Tech, Socorro, NM, March 2015.
- Colloquium talk, Department of Applied Mathematics & Statistics, University of California, Santa Cruz, CA, February 2015.
- Colloquium talk, Department of Applied Mathematics and Statistics, Colorado School of Mines, CO, February 2015.
- Colloquium talk, Department of Mathematics, North Carolina State University, Raleigh, NC, January 2015.
- Invited talk, Joint Fluids and Controls Seminar, University of California, San Diego, CA, March 2014.
- Invited talk, Mini-symposium on Modeling, Estimation and Control of Distributed Parameter Systems I, 52nd IEEE Conference on Decision and Control, Firenze, Italy, December 2013.
- Invited talk, AWM Workshop for Women Graduate Students and Recent PhDs, SIAM 2013, San Diego, CA, July 2013.
- Poster presentation, the 8th Workshop on Control of Distributed Parameter Systems, Craiova, Romania, July 2013.
- Invited talk, SIAM Conference on Computational Science and Engineering, Boston, MA, February 2013.

- Invited talk, Applied Math Seminar, Claremont Center for the Mathematical Sciences, Claremont, CA, November 2012.
- Contributed talk, 5th Annual Women in Mathematics in Southern California Symposium, University of Southern California, Los Angeles, CA, October 2012.
- Invited talk, Partial Differential Equations Seminar, University of Southern California, Los Angeles, CA, October 2012.
- Contributed talk, Joint Mathematics Meetings, Hynes Convention Center, Boston, MA, January 2012.
- Contributed talk, SIAM Student Chapter, Virginia Tech, Blacksburg, VA, October 2011.
- Invited talk, Applied Math Seminar, Department of Mathematics & Statistics, Texas Tech University, Lubbock, TX, October 2011.
- Invited talk, Differential Equations Seminar, University of Virginia, Charlottesville, VA, September 2010.
- Contributed talk, 34th SIAM Southeastern-Atlantic Section Conference, North Carolina State University, Raleigh, NC, March 2010.
- Contributed talk, SIAM Student Conference, Virginia Tech, Blacksburg, VA, February 2010.
- Contributed talk, SIAM Student Chapter, Virginia Tech, Blacksburg, VA, November 2009.

ACADEMIC ACTIVITIES

- Invited participant, Banff Workshop on “Differential-Algebraic Equations and Operator Pencils”, Banff International Research Station, Banff, Alberta, Canada, April 16–21, 2023.
- Invited participant, “Recent Trends in Operator Theory and Working Groups for Women in Operator Theory”, July 26–July 30, 2021, Lorentz Center@Oort –Leiden, The Netherlands (virtual). May 9–15, 2021.
- IPAM workshop on “Transport and Mixing in Complex and Turbulent Flows”, UCLA, January 11–15, 2021.
- Oberwolfach Mini-Workshop on “Mathematics of Dissipation–Dynamics, Data and Control”, May 9–15, Oberwolfach Germany, 2021.
- MSRI Workshop on “Mathematical problems in fluid dynamics” (virtual), January 19, 2021 to May 28, 2021.
- IMA workshop on “Optimal Control, Optimal Transport, and Data Science” (virtual), Nov. 09–13, 2020.
- Senior participant, Spring 2020 Program on High Dimensional Hamilton-Jacobi PDEs to be held at IPAM, for the period of May 3–June 12 (virtual), 2020.
- Invited research visiting at Tampere University hosted by Prof. Lassi Paunonen, Tampere, Finland, December 2–10, 2019.
- Spring school on An Introduction to Modelling and Control of Systems Governed by PDEs, Oaxaca, Mexico, May 16–18, 2019.
- LIASFMA Workshop on Open Problems in Control of PDEs, Tongji University, Shanghai, China, July 1–3, 2018.

- One-month academic visit hosted by Prof. Zhiqiang Wang at Shanghai Key Laboratory for Contemporary Applied Mathematics, Fudan University, on the research project “Controllability of Transport and Mixing via Fluid Flows”, Shanghai, China, June 6–July 4, 2018.
- International Symposium on Mathematical Control Theory, School of Mathematical Sciences, Fudan University, Shanghai, China, June 5–9, 2018.
- IMA Workshop on Stochastic Control, Computational Methods, and Applications and Queueing and Networks, University of Minnesota, Minneapolis, MN, May 7–18, 2018.
- IMA Workshop on Sensor Location in Distributed Parameter Systems, University of Minnesota, Minneapolis, MN, September 6–8, 2017.
- IMA New Directions Short Course: Mathematical Optimization, University of Minnesota, Minneapolis, MN, August 01–12, 2016.
- IMA Workshop on Dynamics and Differential Equations, University of Minnesota, Minneapolis, MN, June 22–25, 2016.
- The 9th Workshop on Control of Distributed Parameter Systems, Beijing, China, June 29–July 3, 2015.
- International Congress of Mathematicians (ICM14), Seoul, South Korea, August 13–21, 2014.
- The 10th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Madrid, Spain, July 07–11, 2014.
- IMA New Directions Short Course: Topics in Control Theory, Minneapolis, MN, May 27–June 13, 2014.
- Mathematical Congress of the Americas (MCA13), Guanajuato, Mexico, August 2013.
- The 9th Asian Control Conference, Istanbul, Turkey, June 2013.
- The 10th IFAC Workshop on Time Delay Systems, Northeastern University, Boston, MA, June 2012.
- NSF Future Faculty Workshop, Northeastern University, Boston, MA, June 2012.
- SIAM Conference on Control and Its Applications (CT11), Hyatt Regency Baltimore, Baltimore, MD, July 2011.
- 2011 American Control Conference, San Francisco, CA, June 2011.
- Workshop on Future Directions in Applied Mathematics, North Carolina State University, Raleigh, NC, March 2011.
- The 30th Southeastern-Atlantic Regional Conference on Differential Equations, Virginia Tech, Blacksburg, VA, October 2010.
- Mathematical Theory of Networks and Systems (MTNS08), Virginia Tech, Blacksburg, VA, July 2008.

MENTORING AND TEACHING

- **PhD student:** Co-advisor of Jinsil Lee, Department of Mathematics, UGA, 07/2021–06/2023.
- **Master Student:** Rohit Mishra, Department of Mathematics, OSU, 08/2017–05/2019.
- Committee member of Harshal Kaushik, Ph.D candidate at the School of Industrial Engineering and Management, OSU, 10/2017–09/2019.
- Committee member of Bing Xie, Bei Xiao, Nicki Boardman, Oussama Ben Said and Uddhaba Raj Pandey, Ph.D candidates in the Department of Mathematics, OSU, 08/2016–05/2019.
- Co-advised Yangwen Zhang, a Ph.D student at Missouri S&T, 05/2015–05/2018.
- Co-advisor of Nicholas H. Nelsen at OSU for his thesis on “A reduced order framework for optimal control of nonlinear partial differential equations: ROM-based Optimal Flow Control” for his Degree of Bachelor of Science.
- Co-advised Konsta Huhtala, Department of Mathematics and Statistics, Tampere University, Tampere, Finland, 12/2019-05/2022.
- Math 8170, Functional Analysis, Spring 2022, UGA
- Math 8710, Variational Methods, Spring 2021, UGA
- Math 4900, An Introduction to Optimization, Fall 2020, UGA
- Math 4960R, Undergraduate Research, Fall 2020, Spring 2021, UGA
- Math 2700, Elementary Differential Equations, Fall 2020, 2021, 2022, Spring 2020, 2022, UGA
- Math 5010, Calculus of Variations and Optimal Control (graduate-level), Fall 2018, OSU
- Math 5543: Numerical Analysis for Differential Equations (graduate-level), Fall 2017, OSU
- Math 4553: Linear and Nonlinear Programming, Spring 2017, Spring 2018, Spring 2019, OSU
- Math 2233: Differential Equations, Fall 2016, Fall 2017, Fall 2018, Spring 2019, OSU
- Math 501: Numerical Analysis and Computation (graduate-level), Spring 2014, Spring 2015, USC
- Math 118: Fundamental Principles of Calculus, Spring 2013, Spring 2014, Spring 2015, USC
- Math 126: Calculus II (two sections), Fall 2014, USC
- Math 467: Theory and Computational Methods for Optimization, Fall 2012, Fall 2013, USC
- Math 458: Numerical Methods, Fall 2013, USC
- Co-mentored the Graduate Seminar in Analysis, Fall 2013–Spring 2015, USC.
- Gave a series of lectures on Introduction to Control Theory of Distributed Parameter Systems, October 2012–December 2012, USC
- Math 2214: Introduction to Differential Equations, Fall 2011, VT
- Math 1016: Elementary Calculus with Trig I, Online Course, Summer I 2010, VT
- Math 2015: Elementary Calculus with Trig II, Spring 2010, VT
- Math 1224: Vector Geometry Recitation, 2009 Fall, VT

SERVICE AND MISCELLANEOUS

- Secretary of SIAG on Control and Systems Theory, 1/1/2022–
- Associate Editor, Conference Editorial Board of IEEE Control Systems Society, 2020–
- Member, Technical Committee on Distributed Parameter Systems, IEEE Control Systems Society, 2017–
- Associate Editor, 24th International Symposium on Mathematical Theory of Networks and Systems (MTNS 2022).
- Associate Editor for IEEE Conference on Control and Decision (CDC), 2020–
- Associate Editor for American Control Conference (ACC), 2020–
- Associate Editor for SIAM Conference on Control and its Applications, 2019, 2021–2024.
- Member, 7th Technical Committee (TC7) of the International Federation for Information Processing (IFIP), Working Group 7.2, 2021–
- Co-organizer of the special session on “Qualitative Analysis and Control of Evolutionary Partial Differential Equations” at the AMS Fall Southeastern Sectional Meeting at University of Tennessee, Chattanooga, Tennessee, Oct. 15–16, 2022.
- Member, Program Committee for 2021 SIAM Conference on Control and Its Applications (CT21), Spokane Convention Center, Spokane, Washington, July 19–21, 2021.
- Co-organizer of the Minisymposium on “Control of PDEs with an Interface”, SIAM CT21, Spokane Convention Center, Spokane, Washington, July 19–21, 2021.
- Served as a judge for the AWM SIAM AN 21 graduate student poster session.
- Co-organizer of the Georgia Scientific Computing Symposium (virtual), Feb. 27, 2021.
- Organizer of SQuaRE at AIM on “Optimal mixing and control of heat conductive flows via active and passive approaches”, jointly with Andrea Ceretani, Cuiyu He, Lin Mu, and Carlos N. Rautenberg, June 13–17, 2022.
- Co-organizer of the Minisymposium on “Control, Optimization, and Numerical Methods for Infinite Dimensional Systems”, 9th International Congress on Industrial and Applied Mathematics (ICIAM), Valencia, Spain, July 15–19, 2019.
- Co-organizer of the Minisymposium on “Computational methods and analysis for PDE constrained optimization and control”, SIAM Conference on Control and Its Applications, Chengdu, China, June 19–21, 2019.
- Member, Program Committee and the Associate Editor for the SIAM Conference on Control and Its Applications (CT19), Chengdu, China, June 19–21, 2019.
- Member, International Program Committee and the Associate Editor for the IFAC Conference on Control of PDEs, jointly held with the Workshop on Control of Distributed Parameter Systems, Oaxaca, Mexico, May 20–24, 2019.
- Co-organizer of the Minisymposium on “Partial Differential Equations: Analysis, Modeling, and Applications”, the 4th Annual Meeting of SIAM Central States Section, University of Oklahoma, Norman, Oklahoma, October 5–7, 2018.
- Member, Graduate Committee for High School Math Contest and Math Grad Student Society at OSU, 08/2016–08/2017.
- Co-organizer of the PDE analysis seminar at OSU, 08/2016–05/2019.

- Co-organizer of the Minisymposium on Partial Differential Equations: Analysis, Modeling, Computation, and Applications, the 2nd SIAM Central States Section conference, 09/30/2016–10/02/2016, Little Rock, Arkansas.
- Co-organizer of the IMA postdoc seminar at UMN, 10/2015–05/2016.
- Co-organizer of the graduate analysis seminar at USC, 10/2013–05/2015.
- Member, Preliminary qualifying exam committee on Numerical Analysis, Department of Mathematics, USC, 2013–2015.
- Organizer of the seminar on “Introduction to Control Theory of Distributed Parameter Systems”, 10/2012–12/2012, USC.
- Review panelist for USC Zumberge Individual Grant, 2014.
- Review panelist for NSF, DMS, 2019, 2020, 2023
- Audit for ACC 2022.
- Referee for SIAM book; Communications in Computational Physics; ECC 2023; CPDE 2023; MTNS 2023; IFAC Congress 2023; Systems & Control Letters; Operators and Matrices; Applied Mathematics and Optimization; ESAIM: Control, Optimisation and Calculus of Variations; Nonlinear Differential Equations and Applications; Automatica; Mechanical Systems and Signal Processing; IEEE Control Systems Letters (L-CSS); Computers and Mathematics with Applications; Zeitschrift für angewandte Mathematik und Physik; Journal of Scientific Computing; SIAM Journal on Control and Optimization; IEEE Transactions on Automatic Control; Applied Mathematics and Optimization; IMA Journal of Applied Mathematics; Applied Mathematical Modelling; Communications on Pure and Applied Analysis; Acta Mathematica Scientia; Proceedings of 3rd IFAC Workshop on Control of Systems Governed by Partial Differential Equation and XI Workshop Control of Distributed Parameter Systems (Joint CPDE-CDPS 2019); Mathematics of Control, Signals, and Systems; Mathematical Methods in the Applied Sciences; Numerical Methods for Partial Differential Equations; International Journal of Systems Science; Journal of Systems Science and Complexity; International Journal of Numerical Analysis and Modeling, Series B; Advances in Numerical Analysis; Abstract and Applied Analysis; Proceedings of the IEEE Conference on Decision and Control (2017, 2019, 2020, 2021); Proceedings of the European Control Conference, (2015, 2019, 2020, 2021); Proceedings of 25th Mediterranean Conference on Control and Automation; Proceedings of the IFAC World Congress, 2017; Proceedings of the 10th IFAC Symposium on Nonlinear Control Systems, 2016; Proceedings of the American Control Conference, 2013–2015, 2019–2021; Proceedings of the Chinese Control Conference, 2013; Proceedings of the Asian Control Conference, 2013; GSA Research Symposium, Virginia Tech, 2012.