

Weiwei Hu

416 Math Science Building
Oklahoma State University
Stillwater, OK 74078-1058

Office Phone: 1-405-744-5783
E-mail: weiwei.hu@okstate.edu
Homepage: <http://math.okstate.edu/people/wh>

EMPLOYMENT

- 08/2016–present, Assistant Professor (Tenure-Track), Department of Mathematics, Oklahoma State University, Stillwater, OK.
- 09/2015–08/2016, Regular Postdoctoral Fellow, Institute for Mathematics and its Applications (IMA), University of Minnesota, Minneapolis, MN.
- 08/2013–05/2015, 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

- Approximation and mathematical control theory of partial differential equations.
- Well-posedness and long-time behavior of mathematical fluid dynamics.
- Optimal control of transport and mixing via fluid flows.
- Control and optimization of network dynamics.
- Computational methods for optimal control design and model reduction.

PUBLICATIONS

1. W. Hu and J. Wu, Boundary Control for Optimal Mixing via Navier-Stokes Flows, submitted to *SIAM Journal on Control and Optimization*, under revision.
2. W. Hu, An Approximating Control Design for Optimal Mixing by Stokes Flows, submitted to *Applied Mathematics & Optimization*. <http://arxiv.org/abs/1711.07052>.
3. 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*, to appear.
4. 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, submitted to *SIAM Journal on Numerical Analysis*. <http://arxiv.org/abs/1801.01056>, under revision.
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, submitted to *Mathematics of Computation*. <https://arxiv.org/abs/1801.01461>.

6. X. He, W. Hu and Y. Zhang, Observer-based Feedback Stabilization of Navier-Stokes Equations, submitted to *Computer Methods in Applied Mechanics and Engineering*, under revision.
7. 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*.
<https://doi.org/10.1007/s10915-018-0668-z>.
8. W. Hu, J. Shen, J. Singler, Y. Zhang, and X. Zheng, An HDG Method for Distributed Control of Convection Diffusion PDEs, submitted to *Journal of Computational and Applied Mathematics*. <https://arxiv.org/abs/1801.00082>, under revision.
9. W. Hu, J. Shen, J. Singler, Y. Zhang, and X. Zheng, A Superconvergent Hybridizable Discontinuous Galerkin Method for Dirichlet Boundary Control of Elliptic PDEs, submitted to *Numerische Mathematik*. <https://arxiv.org/abs/1712.02931>.
10. W. Hu, Enhancement of Heat Transfer in Stokes Flows, *Proceedings of the 56th IEEE Conference on Decision and Control*, 2017, 59–63.
11. 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*.
<https://doi.org/10.1016/j.physd.2017.07.003>.
12. W. Hu, Boundary Control for Optimal Mixing by Stokes Flows, *Applied Mathematics & Optimization*. <https://doi.org/10.1007/s00245-017-9404-6>.
13. 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.
14. 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.
15. 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.
16. W. Hu, J. Singler and Y. Zhang, Feedback Control of a Thermal Fluid Based on a Reduced Order Observer, *Proceedings of 10th IFAC Symposium on Nonlinear Control Systems*, 2016, 116–121.
17. 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.
18. 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.
19. 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.
20. 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 Mathématique*, 353(3), 2015, 241–245.
21. W. Hu, I. Kukavica and M. Ziane, Persistence of Regularity for the Viscous Boussinesq Equations with Zero Diffusivity, *Asymptotic Analysis*, 91, 2015, 111–124.

22. 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.
23. 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.
24. 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.
25. H. B. Xu and W. Hu, Analysis and Approximation of a Reliable Model, *Applied Mathematical Modelling*, 37(6), 2013, 3777–3788.
26. H. B. Xu and W. Hu, Modelling and Analysis of Repairable Systems with Preventive Maintenance, *Applied Mathematics and Computation*, 224, 2013, 46–53.
27. 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.
28. W. Hu and H. B. Xu, Numerical Analysis of a Repairable Multi-State Device, *Proceedings of the Asian Control Conference*, 2013, 1–5.
29. 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.
30. 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.
31. 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.
32. 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.
33. 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.
34. 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.
35. 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.
36. 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.
37. C. Xie, C. Yao, and W. Hu, Eigenvalue Sorting Problem in Flutter Analysis, *Mathematics in Practice and Theory*, 37(18), 2007, 141–146.
38. W. Hu, Asymptotic Stability of a Parallel Repairable System with Warm Standby under Common-cause Failure, *Acta Functionalis Applicata*, 8(1), 2006, 1–11.
39. 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.

40. 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.

In preparation

1. W. Hu and C. Rautenburg, Sparse Feedback Optimal Control via Total Variation Minimization with Applications to Parabolic PDEs and the Boussinesq System.
2. W. Hu, Dirichlet Boundary Control of Parabolic Systems: A Novel Approach.
3. W. Hu, An Approximating Control Approach for Optimal Transport and Mixing via Navier-Stokes Flows.
4. W. Hu and J. Borggaard, Enhancement of Heat Transfer via Navier-Stokes Flows.
5. W. Hu, R. Lai, H. B. Xu, and C. Zheng, Optimal Impulse Control of a Simple Repairable System in a Nonflexive Banach Space. Preprint. <https://arxiv.org/abs/1703.09392>.
6. W. Hu and K. Ito, Bilinear Control for a Renewable Dynamical System with L^1 -minimization. Preprint.
7. W. Hu, I. Kukavica and M. Ziane, Internal Feedback Stabilization of a Viscous Boussinesq Equations with Zero diffusivity.

SPONSORED RESEARCH

- 01/2018-06/2019 Defense Advanced Research Projects Agency (DARPA) HR001117S0039-Lagrange-FP-014, “Robust Optimization & Control of Dynamic Sensor Systems” \$749,999 (PI at OSU), jointly with J. Burns (PI at VT), M. Demetriou (PI at WPI), and N. Gatsonis (Co-PI at WPI).

HONORS & AWARDS

- OSU FY 2018 Academic Summer Research + 1 Travel Grant. \$9,223.
- OSU FY 2018 Dean’s Incentive Grant. \$3,000.
- 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

- 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.

PRESENTATIONS

- 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, 2016.
- 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, 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.

TEACHING AND MENTORING

- Math 5543: Numerical Analysis for Differential Equations, Fall 2017, OSU
- Math 4553: Linear and Nonlinear Programming, Spring 2017, OSU
- Math 2233: Differential Equations (two sections), Fall 2016, 2017 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 seminars 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
- Committee member of Harshal Kaushik, PhD candidate at the School of Industrial Engineering and Management, OSU, 10/2017–present
- Committee member of Bei Xiao and Nicki Boardman, Ph.D candidates in Department of Mathematics, OSU, 08/2016–present.
- Co-advising Yangwen Zhang, a Ph.D candidate at Missouri S&T, 05/2015–present.
- **Master Student:** Rohit Mishra

SERVICE AND MISCELLANEOUS

- Serve on the Graduate Committee, High School Math Contest, and Math Grad Student Society at OSU, 08/2016–present.
- Organizer of the PDE analysis seminar at OSU, 08/2016–present.
- Co-organizer of the Minisymposium on Partial Differential Equations: Analysis, Modeling, Computation, and Applications, at the 2nd SIAM Central States Section conference, 09/30/2016–10/02/2016, Little Rock, Arkansas.
- Chair of the section “Distributed Parameter Systems IV” at the 22nd International Symposium on Mathematical Theory of Networks and Systems, Minneapolis, 07/12–0715, 2016.
- Co-organizer of the IMA postdoc seminar at UMN, 10/2015–05/2016.
- Review panelist for USC Zumberge Individual Grant, 2014–2015.
- Committee member of the preliminary qualifying exam on numerical analysis, USC, 2013–2015.
- Co-organizer of the graduate analysis seminar at USC, 10/2013–05/2015.
- Served on the preliminary qualifying exam (Numerical Analysis) committee in Department of Mathematics, USC, 2013–2015.
- Organizer of the seminar on Introduction to Control Theory of Distributed Parameter Systems, 10/2012–12/2012, USC.
- Referee for IEEE Transactions on Automatic Control; SIAM Journal on Control and Optimization; Applied Mathematics and Optimization; Mathematics of Control, Signals, and Systems; Applied Mathematical Modelling; Communications on Pure and Applied Analysis; Acta Mathematica Scientia; IMA Journal of Applied Mathematics; 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 56th IEEE Conference on Decision and Control; 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 European Control Conference, 2015; Proceedings of the American Control Conference, 2013–2015; Proceedings of the Chinese Control Conference, 2013; Proceedings of the Asian Control Conference, 2013; GSA Research Symposium, Virginia Tech, 2012.