

Lihong Zhao

Department of Mathematics
Virginia Tech
Email: lhzhao@vt.edu
Website: lihongzhao.github.io
Last updated: Aug 25, 2023

EDUCATION

University of Louisiana at Lafayette (UL Lafayette), Department of Mathematics Lafayette, LA, USA
Ph.D. in Mathematics 2012–2017

Beijing University of Posts and Telecommunications (BUPT), Department of Mathematics Beijing, China
B.S. in Fundamental and Applied Mathematics 2007–2011

ACADEMIC APPOINTMENT

Virginia Tech, Department of Mathematics Blacksburg, VA, USA
Visiting Assistant Professor 2023–present

University of California, Merced (UC Merced), Department of Applied Mathematics Merced, CA, USA
Postdoctoral Fellow 2020–2023

- AAI Intersect Postdoctoral Fellow 2022–2023
- NSF DIRAC-RTG Postdoctoral Researcher 2020–2022 & 2023
- Affiliate Member, Health Sciences Research Institute 2021–2023

University of Idaho (UI), Institute for Modeling Collaboration and Innovation (IMCI) Moscow, ID, USA
Postdoctoral Fellow 2018–2020

- Working Group Member, “Modeling Community Dynamics of Microbiomes”
- Working Group Leader, “Modeling Chlamydia Infection Dynamics in Mice”

RESEARCH INTERESTS

Infectious Diseases Modeling, Dynamical Systems, Population and Evolutionary Dynamics, Uncertainty Quantification, Inverse Problems, Systems Biology, Data Science

PUBLICATIONS AND PREPRINTS

* *All authors in alphabetical order*

† *Joint first authorship*

◇ *Partial alphabetical authorship (only authors with this label are listed in alphabetical order)*

Peer-reviewed Journal Articles:

- **Lihong Zhao**, Stephanie R. Lundy, Francis O. Eko, Joeseeph U. Igietseme, Yusuf O. Omosun. “Genital tract microbiome dynamics are associated with time of *Chlamydia* infection in mice”. *Scientific Reports* (2023) 13: 9006. doi:[10.1038/s41598-023-36130-3](https://doi.org/10.1038/s41598-023-36130-3).
- Zhuolin Qu†, Denis Patterson†, Lauren Childs◇, Christina Edholm◇, Joan Ponce◇, Olivia Prosper◇, **Lihong Zhao**◇. “Modeling Immunity to Malaria with an Age-Structured PDE Framework”. *SIAM Journal on Applied Mathematics* (2023) 83(3): 1098–1125. doi:[10.1137/21M1464427](https://doi.org/10.1137/21M1464427).
- **Lihong Zhao**†, Fabian Santiago†, Erica M. Rutter, Shilpa Khatri, Suzanne Sindi. “Modeling and Global Sensitivity Analysis of Strategies to Mitigate COVID-19 Transmission on a Structured College Campus”. *Bulletin of Mathematical Biology* (2023) 85: 13. doi:[10.1007/s11538-022-01107-2](https://doi.org/10.1007/s11538-022-01107-2).

- A. Ali Heydari, Oscar A. Davalos, **Lihong Zhao**, Katrina K. Hoyer, Suzanne S. Sindi. “ACTIVA: realistic single-cell RNA-seq generation with automatic cell-type identification using introspective variational autoencoders”. *Bioinformatics* (2022): btac095. doi:[10.1093/bioinformatics/btac095](https://doi.org/10.1093/bioinformatics/btac095).
- Azmy S. Ackleh*, Karyn L. Sutton*, Tingting Tang*, **Lihong Zhao***. “A Second Order Finite Difference Scheme for a Variable Infection-Structured Model of *Mycobacterium marinum* Dynamics in Aquatic Animals”. *Journal of Nonlinear and Variational Analysis* (2018) 2(2): 177-202. doi:[10.23952/jnva.2.2018.2.06](https://doi.org/10.23952/jnva.2.2018.2.06).
- Karyn L. Sutton^o, **Lihong Zhao**^o, Jacoby Carter. “The Estimation of Growth Dynamics for *Pomacea maculata* from Hatchling to Adult”. *Ecosphere*(2017) 8(7): e01840. doi:[10.1002/ecs2.1840](https://doi.org/10.1002/ecs2.1840).
- Jared T. Guilbeau*, Md Istiaq Hossain*, Sam D. Karhbet*, Ralph Baker Kearfott*, Temitope S. Sanusi*, **Lihong Zhao***. “A Review of Computation of Mathematically Rigorous Lower Bounds on Optima of Linear Integer Programs”. *Journal of Global Optimization* (2017) 68: 677-683. doi:[10.1007/s10898-016-0489-2](https://doi.org/10.1007/s10898-016-0489-2).

Peer-reviewed Articles in Proceedings:

- **Lihong Zhao**[†], Ruby Kim[†], Lucy S. Oremland, Mukti Chowkwale, Lisette G. de Pillis, and Heather Z. Brooks. “A survey of mathematical modeling of hormonal contraception and the menstrual cycle”. To appear in *Mathematical Modeling for Women’s Health - Collaborative Workshop for Women in Mathematical Biology* (eds. Ashlee Ford Versypt, Rebecca Segal and Suzanne Sindi).

Other Articles:

- **Lihong Zhao**. “The Vaginal Microbiota and Its Association with Chlamydia”. SIAM News, December 14, 2022. [\[Link\]](#)
- Jared T. Guilbeau*, Md Istiaq Hossain*, Sam D. Karhbet*, Ralph Baker Kearfott*, Temitope S. Sanusi*, **Lihong Zhao***. “Advice for mathematically rigorous bounds on optima of linear programs”. Technical report, University of Louisiana at Lafayette (2016). [\[pdf\]](#)

Under Review:

- Susana Tejada-Garibay, **Lihong Zhao**, Nicholas Hum, Maria Pimentel, Anh L. Diep, Dina R. Weillhammer, Gabriela G. Loots, Katrina K. Hoyer. “In vitro Inhibition of *Coccidioides* Growth by the Tracheal and Intestinal Microbiomes”.

SELECTED GRANTS AND AWARDS

Research and Outreach Funding:

- [Civic Engagement Microgrant, Research!America](#) (\$1900) 2022
 - To support the community outreach events organized by the group [Math and Computer Science Research Engagement \(MCoRE\)](#) at UC Merced
- 2022 Convergence Accelerator Team Award (\$10,310), with Childs, Edholm, Patterson, Ponce, Prosper, and Qu The NSF-Simons Center for Multiscale Cell Fate Research, University of California, Irvine (UC Irvine) 2022
 - For the project “Developing methodologies for spatial and demographic heterogeneity in malaria immune dynamics”
- [Intersect Fellowship for Computational Scientists and Immunologists](#) (\$56,712) 2022
 - This fellowship program is intended to improve communication and understanding between immunology researchers and computational scientists. Up to 10 awardees selected each year since 2019.
- American Institute of Mathematics (AIM) Structured Quartet Research Ensembles (SQuaRE), with Childs, Edholm, Patterson, Ponce, Prosper, and Qu 2021
 - *Converted to the AIM style workshop “Multi-scale modeling of malaria” held in April 2023*
- NIH R21 Grant, “Data-Driven Approaches to Modeling COVID-19 Dynamics in Reopening Structured Institutions” (unfunded; role: key personnel) 2020

- COVID-19 Seed Grant, Health Sciences Research Institute (HSRI), UC Merced (\$20,000; role: key personnel) “Mathematical Modeling to Mitigate the Spread of COV19 Dynamics on College Campuses” 2020
- Career Booster Award (\$8,200), with Omosun, Center for Complex Biological Systems (CCBS), UC Irvine 2019
 - To support the interdisciplinary collaboration with Yusuf Omosun from Morehouse School of Medicine

Honors and Awards:

- [Mathematical Association of America \(MAA\) Project NExT Fellowship](#) 2021–2022
- National First Prize, China Undergraduate Mathematical Contest in Modeling 2010 (CUMCM-2010) 2010
- Third Prize, Natural Sciences Paper of 10-th BUPT “Innovation Award”, BUPT Graduate Union 2010
- BUPT Comprehensive Quality Scholarship 2010
- National Second Prize, CUMCM-2009 2009

Travel Awards:

- American Mathematical Society (AMS) Mathematics Research Communities Collaboration Travel Grant 2023
 - For collaborative research scheduled in Jan. 2023, with Childs, Edholm, Patterson, Ponce, Prosper, and Qu (\$1000 for each junior participant); role: primary contact
- Travel Funds for 2022 Association for Women in Mathematics (AWM) Research Symposium (\$1500) 2022
- AAI Intersect Fellowship Program Trainee Travel Award (\$1500) 2022
- 7th International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems (ICMA-VII) Travel Support (\$810) 2019
- Society for Industrial and Applied Mathematics (SIAM) Early Career Travel Award (\$3640 in total) 2019, 2022
- Society for Mathematical Biology (SMB) Landahl Award (\$1700 in total) 2016, 2017, 2023
- Biology and Medicine through Mathematics Conference (BAMM!) Travel Award (\$790 in total) 2016, 2017
- AMS Graduate Student Travel Grants (\$250) 2016
- SIAM Student Travel Awards (\$1300 in total) 2014, 2015
- UL Lafayette Student Government Association Conference Funding (\$200) 2017
- UL Lafayette Graduate Student Organization Travel Funding (\$1900 in total) 2015, 2016, 2017

PRESENTATIONS

Conference and Seminar Talks:

- (*Forthcoming, invited*) AMS Special Session on Complex Social Systems
Joint Mathematics Meetings (JMM), San Francisco, CA Jan. 4, 2023
- 10th International Congress on Industrial and Applied Mathematics (ICIAM 2023)
Waseda University, Tokyo, Japan Aug. 20-25, 2023
- (*Invited*) Minisymposium “Modeling sex differences in health and disease”
2023 Annual Meeting of the Society for Mathematical Biology (SMB2023), Columbus, OH July 20, 2023
- Early Career Workshop, SMB2023, Columbus, OH July 16, 2023
- (*Virtual, invited*) Seminar Talk, Theoretical Biology and Biophysics (T-6)
Los Alamos National Laboratory June 28, 2023
- (*Invited*) Special Session on Recent Developments in Mathematical Biology
2023 Spring Meeting of the AMS Western Section, Fresno, CA May 6, 2023
- Southern California Applied Mathematics Symposium (SOCAMS 2023), Irvine, CA April 22, 2023
- (*Invited*) AMS Special Session on Understanding COVID-19: Three Years of Mathematical Models
to Address the Global Pandemic, JMM 2023, Boston, MA Jan. 4, 2023

- 2022 SIAM Conference on the Life Sciences (LS22), Pittsburgh, PA July 14, 2022
- (*Invited*) Special Session on Recent Developments in Ecological and Epidemiological Modeling
AWM Research Symposium, University of Minnesota, Minneapolis, MN June 17, 2022
- (*Virtual, invited*) Mathematical Biology Seminar, Iowa State University May 4, 2022
- (*Virtual, invited*) Mathematical Biology Seminar, Virginia Tech April 20, 2022
- (*Virtual, invited*) AMS Special Session on Dynamics of Infectious Diseases: Ecological Models Across
Multiple Scales & AWM Special Session on Women in Mathematical Biology, JMM 2022 April 7-8, 2022
- (*Hybrid*) Mathematical Biology Seminar, Department of Mathematics, UC Merced Oct. 6, 2021 & Mar. 2, 2022
- (*Virtual*) SMB Math-Epidemiology/Math-Immunology Subgroups Mid-Year Mini Virtual Conference Feb. 28, 2022
- (*Virtual, invited*) Minisymposium “Advances in Infectious Disease Modeling”, SMB2021 June 15, 2021
- (*Virtual*) SMB Mathematical Epidemiology/Math Education Subgroup Mini-Conference Feb. 8, 2021
- (*Virtual, invited*) Dr. Yoav Ram’s Lab Meeting, Tel Aviv University, Israel Nov. 19, 2020
- (*Virtual, invited group presentation*) Mathematical Biology Seminar, The University of Arizona Oct. 15, 2020
- (*Virtual*) Mathematical Biology Seminar, Department of Mathematics, UC Merced Sept. 9, 2020
- (*Virtual*) 2020 Annual Meeting of the Society for Mathematical Biology (eSMB2020) Aug. 20, 2020
- (*Cancelled due to COVID-19*) SIAM Conference on the Life Sciences (LS20), Garden Grove, CA June 2020
- (*Cancelled due to COVID-19*) Biology and Medicine through Mathematics Conference (BAMM!) May 2020
- (*Virtual, invited*) Mathematical Biology Seminar, Washington State University Mar. 24, 2020
- (*Invited*) Short Course in Systems Biology Foundation, CCBS, UC Irvine, Irvine, CA Feb. 8, 2019 & Jan. 31, 2020
- (*Invited*) AMS-AWM Special Session on Women in Mathematical Biology, JMM 2020, Denver, CO Jan. 15, 2020
- 7th International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems
(ICMA-VII), Arizona State University, Tempe, AZ Oct. 12, 2019
- 9th International Congress on Industrial and Applied Mathematics (ICIAM 2019), Valencia, Spain July 17, 2019
- CMCI Brown Bag Lunch Talk, UI, Moscow, ID July 8, 2019
- 2017 Annual Meeting of the Society for Mathematical Biology
University of Utah, Salt Lake City, Utah July 17, 2017
- BAMM!, Virginia Commonwealth University, Richmond, VA May 21, 2016 & May 18, 2017
- AMS Student Chapter Graduate Student Seminar, UL Lafayette, Lafayette, LA Feb. 21, 2017
- Applied Math Seminar, Department of Mathematics, UL Lafayette, Lafayette, LA April 30, 2015 & Nov. 8, 2016
- Gulf and South Atlantic Regional Panel on Aquatic Invasive Species
USGS Wetland and Aquatic Research Center, Lafayette, LA Oct. 4, 2016
- AMS Spring Southeastern Sectional Meeting, University of Georgia, Athens, GA March 5, 2016
- 8th International Congress on Industrial and Applied Mathematics (ICIAM 2015), Beijing, China Aug. 14, 2015
- SIAM Conference on Applications of Dynamical Systems (DS15), Snowbird, UT May 19, 2015
- Inaugural Meeting on the Maculata Apple Snail in Louisiana
Nicholls State University, Thibodaux, LA Aug. 12, 2014
- SIAM Conference on the Life Sciences (LS14), Charlotte, NC Aug. 6, 2014

Posters:

- Dynamical Systems in the Life Sciences Workshop, Columbus, OH July 14, 2023
- (*Virtual*) 8th International Conference on Infectious Disease Dynamics, Bologna, Italy Nov. 30, 2021
- CMCI EAC Science Expo, UI, Moscow, ID April 12, 2019
- 2016 Annual Meeting of the Society for Mathematical Biology and European Conference for Mathematical and
Theoretical Biology (ECMTB/SMB 2016), University of Nottingham, Nottingham, United Kingdom July 12, 2016

CONFERENCES, SHORT COURSES, AND WORKSHOPS

- AMS Mathematical Research Community “[Complex Social Systems](#)”, Java Center, NY June 18-24, 2023
- American Institute of Mathematics (AIM) Workshop: Multi-scale modeling of malaria
(*converted from Structured Quartet Research Ensembles [SQuaRE]*) April 10-14, 2023
- (*Virtual*) BIRS Workshop “Sex Differences in Physiology: Mathematical Modelling and Analysis” Mar. 5-10, 2023
- (*Virtual*) Simons Institute for the Theory of Computing Workshop: Epidemics and Information Diffusion Oct. 24-28, 2022
- MAA MathFest 2022, Philadelphia, PA Aug. 3-6, 2022
- [Collaborative Workshop for Women in Mathematical Biology: Mathematical Approaches to Support Women’s Health](#), Institute for Mathematics and its Applications, Minneapolis, MN June 20-24, 2022
- Aligning Actions at Crossroads: An Intersectional Approach to Addressing Harassment in the Mathematical Sciences Workshop, Minneapolis, MN June 16, 2022
- IMMUNOLOGY2022, the 105-th Annual Meeting of AAI, Portland, OR May 6-10, 2022
- (*Virtual*) MAA MathFest 2021 Aug. 4-7, 2021
- (*Virtual*) AMS Mathematical Research Community
“[Dynamics of Infectious Diseases: Ecological Models Across Multiple Scales](#)” 2020-2021
- (*Virtual*) MSRI Workshop: Mathematical Models for Prediction and Control of Epidemics Aug. 12-14, 2020
- (*Virtual*) Understanding and Exploring Network Epidemiology in the Time of Coronavirus ([Net-COVID](#)) April 2020
- 8th Annual Southern California Systems Biology Conference, UC Irvine Feb. 9, 2019
- NIMBioS Tutorial: [Network Modeling](#), University of Tennessee Feb. 4-6, 2019
- The CMCI Modeler’s Workshop with Aaron King, UI Jan. 25, 2019
- A Short Course in Systems Biology Foundation, CCBS, UC Irvine May 7-25, 2018
- Lloyd Roeling UL Lafayette Mathematics Conference, UL Lafayette Nov. 2-4, 2012 & Nov. 11-13, 2016

TEACHING EXPERIENCE

- Instructor of Record:
 - Preparation for Calculus (Math 1214), Virginia Tech Fall 2023
 - Mathematical Modeling (MATH 150), UC Merced Spring 2023
 - Probability and Statistics (MATH 32), UC Merced Fall 2020, Spring 2021, Fall 2021
 - Elementary and Intermediate Algebra (MATH 92), UL Lafayette Spring 2012
- Co-organizer & Instructor of Record: Workshop “[R for Reproducible Science](#)”(BCB 503-02), UI Feb. 27-28, 2020
- Graduate Teaching Assistant:
 - Survey of Calculus (MATH 250), UL Lafayette Spring 2013
 - College Algebra Fundamentals (MATH 100), UL Lafayette Fall 2012

MENTORSHIP

- Undergraduate and Graduate Research
 - Mentoring at Sindi Lab (Applied Mathematics) and Hoyer Lab (Quantitative and Systems Biology), UC Merced
Mentored four graduate students in mathematical modeling, data analysis,
and scientific writing Sept. 2020–Aug. 2023
 - Mentoring an undergraduate student at UI (now graduate student at Montana State University)
in modeling spatially variable cargo-based suppression with multiple parasite strains July 2020–Aug. 2023

- Mentor to a graduate student, SMB2023 July 17, 2023
- Mentor to three graduate students, AWM Graduate Student Poster Session, JMM 2023 Jan. 6-7, 2023
- Mentor to an undergraduate student and a graduate student, eSMB2020 Aug. 17–20, 2020

SERVICE

Service to the Profession:

- Journal Referee for Letters in Biomathematics, Journal of Biological Dynamics, Journal of Biological Systems
- Mini-symposium Submissions Reviewer for the Math Epi Subgroup, SMB2023 Mar. 2023
- (Co-)Organizer
 - Mathematical Biology Seminar, UC Merced 2021–present
 - Mini-symposium/Special Session
 - * “AWM Special Session on Women in Mathematical Biology”, JMM 2024
 - * “Calibration and Validation of Mathematical Models for Biological Systems”, ICIAM 2023
 - * “Recent developments in Mathematical Biology”, 2023 Spring Meeting of the AMS Western Section
 - * “Development and Calibration of Multiscale Models for Complex Biological Systems”, SIAM-LS22
 - * “Advances in Infectious Disease Modeling”, SMB2021
 - * “Mathematical and Computational Modeling in Ecology and Epidemiology”, ICIAM2019
- Poster/Paper Presentation Judge
 - AMS-PME Undergraduate Student Poster Session at JMM 2023 Jan. 6, 2023
 - AWM Workshop Poster Presentations at JMM 2023 Jan. 6, 2023
 - MAA Undergraduate Student Poster Session at MathFest 2022 Aug. 5, 2022
 - (*Virtual*) AWM Poster Session at JMM 2022 Mar. 29–April 5, 2022
 - (*Virtual*) MAA Undergraduate Student Paper Session at MathFest 2021 Aug. 7, 2021
 - (*Virtual*) SMB2021 Poster Session June 15, 2021
 - MAA Undergraduate Student Poster Session at JMM 2020 Jan. 17, 2020
 - College of Science Student Research Exposition, UI Oct. 18, 2018 & Oct. 31, 2019

Service to the Community:

- Co-founder, [Math and Computer Science Research Engagement \(MCoRE\)](#), UC Merced 2022–present
Provide unrepresented and underprivileged high school students in the Central Valley with extracurricular STEM activities (with an emphasis on Math and Computer Science) in a supportive environment where they can discover the appeal of these domains with the hopes of encouraging them to pursue higher education and research in these areas.
- Evaluator, the Regeneron Science Talent Search, Society for Science Nov. 11-21, 2022
- Discussion Leader, “Project NExT Made Us Do It: Successes, Failures, and What We Wished We Had Known Before”, Philadelphia, PA Aug. 3, 2022
- Committee
 - Organizing Committee Member, UC Merced Applied Mathematics Research Retreat 2022
 - Search Committee Member, IMCI Postdoctoral Fellow in Statistical Modeling, UI 2020
- Organizing Committee Member, Society for Mathematical Biology 2021 Annual Meeting (SMB2021) 2021
 - Co-organized the [SMB Workshop on Diversity, Equity and Inclusion](#)
 - Co-planned DEI sessions at SMB2021
 - [Thank you letter from Heiko Enderling, the SMB President](#)
- Panel Co-moderator, SMB Early Careers Workshop, University of Utah July 16, 2017

PROFESSIONAL TRAINING

- (*Virtual*) 2020 Cohort, [Building Future Faculty Program](#), North Carolina State University Apr. 12-14, 2021
- (*Virtual*) Faculty Institute, UC Merced July 22-24, 2020
- The Carpentries Instructor Training Oct. 24-25, 2019
 - Certified Instructor since Jan. 2020
- Preparing Future Faculty Seminar, UI Fall 2018, Spring 2019
- Instructor Workshop for Freshman Quantitative Reasoning Course, UL Lafayette June 24, 2015

SKILLS

- **Language:** Mandarin (native), English (fluent)
- **Software and Programming Language:** MATLAB, R, Mathematica, SPSS, C++, L^AT_EX, Gephi, NetLogo

PROFESSIONAL MEMBERSHIPS

- American Association of Immunologists
- American Mathematical Society
- Association for Women in Mathematics
- Society for Industrial and Applied Mathematics
- Society for Mathematical Biology