

Zhuolin Qu

Curriculum Vitae

University of Texas at San Antonio
Department of Mathematics
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📄 <https://zhuolinqu.github.io>

Research Interests

Mathematical and Computational Biology, Infectious Diseases Modeling, Population Dynamics, Numerical Methods for Nonlinear PDEs, Scientific Computing, Uncertainty Quantification

Education

- 2011–2016 **Doctor of Philosophy, Applied Mathematics, Tulane University.**
Advisor: Alexander Kurganov
Thesis: Fast Operator Splitting Methods for Nonlinear PDEs
- 2012–2016 **Master of Science, Statistics, Tulane University.**
Advisor: Michelle Lacey
- 2007–2011 **Bachelor of Science, Mathematics and Computational Science, University of Science and Technology of China.**
Advisor: Mengping Zhang

Academic Experience

- 2020–present **Assistant Professor, Department of Mathematics, University of Texas at San Antonio.**
- 2016–2020 **Postdoctoral Fellow, Department of Mathematics, Tulane University.**
Mentor: James (Mac) Hyman
- 2017–2019 **Visiting Scholar, Los Alamos National Laboratory.**
(Summer) Theoretical Biology and Biophysics (T-6), Host: Benjamin McMahon
- 2015 **Summer Intern, Los Alamos National Laboratory.**
Computational Earth Science (EES-16), Mentor: Carl Gable, Nataliia Makedonska
- 2012, 2013 **Visiting Fellow, Shanghai Jiao Tong University, China.**
(Summer) Institute of Natural Sciences
- 2010 **Summer Intern, Pohang University of Science and Technology, Korea.**
Combinatorial and Computational Mathematics Centre, Mentor: Kwang Ik Kim.

Publications and Preprints

(*denotes authors in alphabetical order, [†]denotes corresponding author)

- Peer-reviewed Journal
- Kurganov, A.[†], **Qu, Zhuolin**^{*}, and Wu, T. Well-Balanced Positivity Preserving Adaptive Moving Mesh Central-Upwind Schemes for the Saint-Venant System. *ESAIM: Mathematical Modelling and Numerical Analysis*, 2022, 56(4); 1327-1360.
 - Gulbudak, H.[†], **Qu, Zhuolin**, Milner, F., and Tuncer, N., Sensitivity Analysis in an Immuno-Epidemiological Vector-Host Model. *Bulletin of Mathematical Biology*, 2022, 84; 27.

- Stoecker, C.[†], Monette, A., **Qu, Zhuolin**, Schmidt, N., Craig-Kuh, M. C., and Kissinger, P. Cost Effectiveness of Check It: A Novel Community-based Chlamydia Screening and Expedited Treatment Program for Young Black Men. *Clinical Infectious Diseases*, 2021; ciab818.
- Azizi, A.[†], Dewar, J., **Qu, Zhuolin**, and Hyman, J. M. Using an Agent-based Sexual-network Model to Analyze the Impact of Mitigation Efforts for Controlling Chlamydia. *Epidemics*, 2021, 35; 100456.
- **Qu, Zhuolin**, Azizi, A., Schmidt, N., Craig-Kuh, M. C., Stoecker, C., Hyman, J. M., and Kissinger, P.[†] Effect of Screening Young Men for Chlamydia Trachomatis on the Rates among Women: A Network Modelling Study for High-prevalence Communities. *BMJ Open*, 2021, 11; e040789.
- **Qu, Zhuolin**[†], McMahon, B. H., Perkins, D. J., and Hyman, J. M. Staged progression epidemic models for the transmission of invasive nontyphoidal Salmonella (iNTS) with treatment. *Mathematical Biosciences and Engineering*, 2021, 18(2): 1529-1549.
- Azizi, A.[†], **Qu, Zhuolin**, Lewis, B., and Hyman, J. M. Generating a Heterosexual Bipartite Network Embedded in Social Network. *Applied Network Science*, 2021, 6, 30.
- Kurganov, A.[†], **Qu, Zhuolin**^{*}, Rozanova, O. S., and Wu, T. Adaptive Moving Mesh Central-Upwind Schemes for Hyperbolic System of PDEs: Applications to Compressible Euler Equations and Granular Hydrodynamics, *Communications on Applied Mathematics and Computation*, 2021, 3, 445–479.
- Thongsripong, P.[†], **Qu, Zhuolin**, Yukich, J., Hyman J. M., and Wesson, D. An Investigation of Human-Mosquito Contact Using Surveys and its Application in Assessing Dengue Viral Transmission Risk. *Journal of Medical Entomology*, 2020, 57(6), 1942–1954.
- **Qu, Zhuolin**[†] and Hyman, J. M. Generating a Hierarchy of Reduced Models for a System of Differential Equations Modeling the Spread of *Wolbachia* in Mosquitoes. *SIAM Journal on Applied Mathematics*, 2019, 79(5):1675-1699.
- **Qu, Zhuolin**[†], Xue, L., and Hyman, J. M. Modeling the Transmission of *Wolbachia* in Mosquitoes for Controlling Mosquito-Borne Diseases. *SIAM Journal on Applied Mathematics*, 2018, 78(2):826–852.
- Cheng, Y. Z., Kurganov, A.[†], **Qu, Zhuolin**^{*}, and Tang, T. Fast and Stable Explicit Operator Splitting Methods for Phase-field Models. *Journal of Computational Physics*, 2015, 303:45-65.
- Kao, C. Y., Kurganov, A.[†], **Qu, Zhuolin**^{*}, and Wang, Y. A Fast Explicit Operator Splitting Method for Modified Buckley-Leverett Equations. *Journal of Scientific Computing*, 2015, 64(3):837-857.
- Chertock, A., Kurganov, A.[†], **Qu, Zhuolin**^{*}, and Wu, T. Three-Layer Approximation of Two-Layer Shallow Water Equations. *Mathematical Modelling and Analysis*, 2013, 18(5):675-693.
- Conference Proceeding ○ Thongsripong, P., **Qu, Zhuolin**, Hyman, J. M., and Wesson, D. Quantification of Mosquito Biting Rates Using Surveys and their Implication in Determining Dengue Viral Transmission Risk in the Greater New Orleans Region. In *The American Journal of Tropical Medicine and Hygiene*, 2018, 99(4)

- Under Review
- **Qu, Zhuolin[†]**, Wu, T., Hyman, J. M. Modeling Spatial Waves of Wolbachia Invasion for Controlling Mosquito-borne Diseases.
 - **Qu, Zhuolin^{*}**, Patterson, D.^{*}, Childs, L.[†], Edholm, C., Ponce, J., Prosper, O., Zhao, L. Modeling Immunity to Malaria with an Age-Structured PDE Framework.
*denotes equal contribution.

Papers in Preparation (drafts available on request)

- Geneus, C., Kataria, R., **Qu, Zhuolin**, Azizi, A., Hickmann, K., Hyman, J. M., The Early Growth of an Epidemic in a Stochastic Agent-based Network Model
- Florez, D. A., Young, A. J., Bernabe, K., Stager, B. P., Hyman, J. M., and **Qu, Zhuolin[†]** Modeling sustained transmission of *Wolbachia* among *Anopheles* mosquitoes: Implications for Malaria control in Haiti

Honors and Awards

- 2022 **AWM-NSF Travel Fund**, AWM Research Symposium, \$1500.
- 2022 **Convergence Accelerator Team (CAT) Award**, “Developing Methodologies for Spatial and Demographic Heterogeneity in Malaria Immune Dynamics”, NSF-Simons Center for Multiscale Cell Fate Research, \$10,310.
Role: Primary Contact
- 2021 **American Institute of Mathematics (AIM), SQuaREs**, “Modeling Immunity to Malaria with an Age-Structured PDE Framework”, (converted to workshop).
Role: Primary Contact
- 2020 **MIDAS COVID-19 Urgent Grant - Supplemental Funding**, “Optimizing COVID-19 Awareness and Testing Strategy”, MIDASUGP2020-2, \$9,999.
Role: Co-Investigator
- 2017–2019 **Postdoctoral Fellow Travel Fund**, Tulane University.
- 2017 **Health Sciences Research Days Award for Excellence in Research and Presentation by a Postdoctoral Fellow**, Tulane University.
Evaluated by a panel of judges in health science among nearly 200 presentations
- 2015–2019 **Travel Awards**, Awarded 15 competitive grants for travel to conferences and workshops.
- 2012–2015 **Summer Research Fellowship**, Tulane University.

Conference and Talks

- Invited Talks
- **AWM Reseach Symposium**, Mini-symposium talk, University of Minnesota, 06/2022
 - **The Fields Institute** for Research in Mathematical Sciences, Colloquium on Mathematics for Public Health, virtual, 04/2022
 - **Joint Mathematics Meetings 2022**, AWM speical session, virtual, 04/2022
 - **Joint Mathematics Meetings 2022**, Mini-symposium talk, virtual, 04/2022
 - **Oregon State University**, Mathematical Biology Seminar, virtual, 03/2022
 - **Virginia Tech**, Mathematical Biology Seminar, virtual, 02/2022
 - **Middle Tennessee State University**, Mathematical Biology Seminar, 11/2021

- **SIAM Texas-Louisiana Sectional Meeting**, Mini-symposium talk, University of Texas Rio Grande Valley, South Padre Island, 11/2021
- **Kennesaw State University**, Mathematical Biology Seminar, virtual, 10/2021
- **Tulane University**, Applied Math Seminar, virtual, 10/2021
- **SMB Annual Meeting 2021**, Mini-symposium talk, virtual, 06/2021
- **Utah State University**, Applied Math Seminar, virtual, 04/2021
- **Texas Tech University**, Biomathematics Seminar, virtual, 03/2021
- **Tulane University**, Guest lecture on “Epidemic Modeling Case Studies”, virtual, 02/2021
- **Joint Mathematics Meetings 2021**, Mini-symposium talk, virtual, 01/2021
- **Tulane University**, Guest lecture on “Modeling the Spread of Infectious Diseases”, virtual, 10/2020
- **SIAM Texas-Louisiana Sectional Meeting**, Mini-symposium talk, virtual, 10/2020
- **SIAM Texas-Louisiana Sectional Meeting**, Mini-symposium talk, Southern Methodist University, 11/2019
- **Georgia State University**, Mathematics and Statistics Colloquium, 10/2019
- **Georgia State University**, School of Public Health, Population Health Science Seminar, 10/2019
- **Seventh International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems (ICMA VII)**, Mini-symposium talk, Arizona State University, 10/2019
- **Louisiana State University Health Sciences Center**, Biostatistics Colloquium, New Orleans, 10/2019
- **Epidemiology Seminar**, School of Public Health and Tropical Medicine, Tulane University, 09/2019
- **Fifth International Conference on Computational and Mathematical Population Dynamics (CMPD5)**, Mini-symposium talk, Fort Lauderdale, 05/2019
- **University of Louisiana at Lafayette**, Mathematics Colloquium, 10/2018
- **Los Alamos National Laboratory**, Brown bag meeting on disease transmission modeling and surveillance, Seminar talk, 07/2018
- **42nd SIAM SEAS Sectional Conference**, Mini-symposium talk, UNC Chapel Hill, 03/2018
- **Guangzhou University**, Mathematical Biology Center, Seminar talk, 11/2017
- **Mathematics and Science College**, Shanghai Normal University, Seminar talk, 11/2017
- **Tropical Medicine Seminar**, School of Public Health and Tropical Medicine, Tulane, 09/2017
- **Los Alamos National Laboratory**, Center for Nonlinear Studies, Seminar talk, 08/2017
- **Georgia State University**, Guest lecture, “How Mathematical Models are helping Guide Mitigation Efforts to Control Epidemics”, 05/2017

- **Graduate Student Colloquium**, Tulane Mathematics Department, 09/2015
 - **Los Alamos National Laboratory**, SFT Brown Bag Seminar, 08/2015
 - **The Ninth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena**, Mini-symposium talk, 04/2015
 - **Tulane University**, Applied Mathematics Seminar, 04/2014
- Contributed Talks
- **SIAM Annual Meeting 2021**, virtual, 07/2021
 - **Mathematics Research Communities**, virtual, 06/2021
 - **Biomathematics and Ecology: Education and Research (BEER)**, virtual, 11/2020
 - **CDC STD Conference 2020**, Atlanta, GA, virtual, 09/2020
 - **Biology and Medicine through Mathematics (BAMM!)**, Virginia Commonwealth University, 05/2020 (abstract accepted, cancelled due to COVID-19)
 - **Scientific Computing around Louisiana**, Tulane University, 02/2019
 - **Biomathematics and Ecology: Education and Research**, Arizona State University, 10/2018
 - **SIAM Annual Meeting 2018**, Portland, OR, 07/2018
 - **Scientific Computing around Louisiana**, Louisiana State University, 02/2018
 - **SIAM Annual Meeting 2017**, Pittsburgh, PA, 07/2017
 - **Scientific Computing around Louisiana**, Tulane University, 03/2017
- Posters
- **SAMSI workshop on Model Uncertainty: Mathematical and Statistical**, Duke University, 08/2018
 - **MBI Emphasis Workshop on Multiscale Dynamics of Infections**, Ohio State University, 04/2018
 - **NIH-MIDAS Network Meeting**, 04/2018
 - **29th Annual Health Sciences Research Days**, Tulane University, 02/2018
 - **SMB Annual Meeting 2017**, 07/2017
 - **NIH-MIDAS Network Meeting**, 05/2017
 - **SIAM Conference on Computational Science and Engineering**, 03/2017
 - **28th Annual Health Sciences Research Days**, Tulane University, 02/2017
 - **KI-Net: Collective Dynamics in Biological and Social Systems**, 11/2015
 - **Los Alamos National Laboratory**, Student Symposium: “Championing Scientific Careers”, 08/2015
 - **Scientific Computing Around Louisiana**, Tulane University, 03/2015
- Workshops Conferences
- **XVIII Red Raider Minisymposium**, “Modeling in a Heterogeneous World”, Texas Tech University, 08/2021
 - **AMS - Mathematics Research Communities**, “Dynamics of Infectious Diseases: Ecological Models Across Multiple Scales”, virtual, 06/2020 - 06/2021
 - **MIDAS Network Annual Meeting**, virtual, 05/2021
 - **Joint Mathematical Epidemiology and Math Education SMB Subgroup Meeting**, virtual, 02/2021

- **Emory TMLS COVID-19 modeling symposium**, “SARS-CoV-2 modeling: What have we learned from this pandemic about how (not) to model disease spread?”, virtual, 01/2021
- **Joint Mathematics Meetings 2021**, Short course on “Mathematical and Computational Methods for Complex Social Systems”, virtual, 01/2021
- **SMB Annual Meeting 2020**, virtual, 08/2020
- **Workshop on Modeling the Spread of Infectious Diseases**, Tulane University, 02/2019 & 02/2020
- **NIMBioS Tutorial: Network Modeling**, University of Tennessee, 02/2019
- **Joint Research Conference on Statistics in Quality, Industry, and Technology**, Santa Fe, 06/2018
- **9th Annual Summer Institute in Statistics and Modeling in Infectious Diseases**, University of Washington, 07/2017
- **NIMBioS Tutorial: Uncertainty Quantification for Biological Models**, 06/2017
- **SAMSI Summer School on Optimization**, 08/2016
- **KI-Net Conference** on Modern Perspectives in Applied Mathematics: Theory and Numerics of PDEs, 04/2014

Service

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| Journal Referee | Journal of Biological Dynamics, PLoS ONE, Journal of Theoretical Biology, Mathematical Biosciences, Letters in Biomathematics, Journal of Biological Systems |
| Review Editor | Frontiers in Tropical Diseases |
| Guest Editor | Mathematical Biosciences and Engineering, Special Issue: “Machine Learning, Mathematical and Statistical Modeling for Systems Biology” Tropical Medicine and Infectious Diseases, Special Issue: “Advancing mathematical models of mosquito-borne diseases” |
| Organizer | <ul style="list-style-type: none"> ◦ Joint Mathematics Meetings 2023, Special Session, “Advances in Modeling Mosquito-borne Disease Dynamics and Control Methods”, 01/2023 ◦ AWM Research Symposium, “Recent Developments in Ecological and Epidemiological Modeling”, University of Minnesota, 06/2022 ◦ Joint Mathematics Meetings 2022, Special Session, “Dynamics of Infectious Diseases Across Multiple Scales”, 04/2022 ◦ SIAM Texas-Louisiana Meeting, mini-symposium, “Mathematical and computational models for understanding emerging epidemics and evaluating intervention strategies”, 10/2020 ◦ New Orleans workshop on Modeling the Spread of Infectious Diseases, Tulane University, Spring 2019 & Spring 2020 ◦ Clifford Lectures, Co-organizer, Tulane University, 2017 |
| Panelist | ◦ NSF Panel reviewer, 06/2022 |
| Department Committee | <ul style="list-style-type: none"> ◦ Admission Committee for Applied and Industrial Math Master (AIM) Program, University of Texas at San Antonio, Fall 2020 - present ◦ Committee for Department Website, University of Texas at San Antonio |

- External Committee
 - PhD Committee, Daniela Pineda, Mathematics, Tulane University, Spring 2022 - present
 - PhD Dissertation Committee, Christian Geneus, Biostatistics, Tulane University, Spring 2020
 - Master Dissertation Committee, Harley Hanes, Center for Computational Science, Tulane University, Spring 2020
 - PhD Dissertation Committee, Li Guan, Mathematics, Tulane University, Fall 2019
 - Undergraduate Honors Thesis Prospectus, Rhea Kataria, Mathematics, Tulane University, Fall 2019
 - PhD Qualifying Exam Committee, Scientific Computing, Tulane University, Fall 2018
- Media Coverage
 - **Math Horizons**, Evelyn J. Lamb, “Fighting an Epidemic with an Epidemic”, *Math Horizons*, 2019, 26:4, 22-23, DOI: 10.1080/10724117.2019.1574148
 - **Forbes Magazine**, Innovation-Science, “Math-Based Mosquito Control To Prevent Human Diseases”, January 14th, 2019
 - **Los Alamos Monitor**, “Solving epidemics with math”, October 10th, 2018
 - **The Times-Picayune**, “Tulane researchers use math to contain the spread of mosquito-borne illnesses”, August 30th, 2018
 - **SIAM News**, Research Nugget on “Sustained bacterial outbreak in mosquitoes limits spread of life-threatening diseases”, March 20th, 2018
- Poster Judge
 - School of Science and Engineering Research Day, Tulane University, 2018, 2019
 - SIAM Texas-Louisiana Sectional Meeting, 2019
- Others
 - **MARC Mentor**, Maximizing Access to Research Careers (MARC) program, 2022
 - **AWM and Math for America**, Student Essay Contest, Interviewee, 2022
 - **Newcomb Fellow**, Newcomb College Institute, 2016–2020, voluntary association of faculty from all undergraduate colleges to support women’s leadership/gender equity and foster faculty-student interaction and research

Teaching Experience

- Instructor of Record
 - University of Texas at San Antonio
 - MAT 3613: Differential Equations I: Fall 2022
 - MAT 2233: Linear Algebra, Spring 2022, Fall 2022, online
 - MAT 3633: Numerical Analysis, Fall 2021, online
 - MAT 1193: Calculus for Biosciences, Fall 2020, Spring 2021, online
 - Tulane University
 - MATH 758: Scientific Computation III (graduate), Spring 2018, Spring 2019
 - MATH 731: Applied Mathematics (graduate), Spring 2020
 - MATH 221: Calculus III, Fall 2016
 - MATH 122: Calculus II, Fall 2013
 - MATH 116: Long Calculus II, Spring 2014
- Teaching Assistant
 - MATH 309/609: Linear Algebra, Fall 2012, Spring 2013
 - MATH 224: Introduction to Applied Mathematics, Spring – Fall 2012, Spring 2015

- MATH 131: Consolidated Calculus, Fall 2014
- MATH 221: Calculus III, Spring 2012
- MATH 122: Calculus II, Spring 2016
- MATH 121: Calculus I, Fall 2011, Fall 2015
- Guest Lectures ○ MATH 732: Applied Mathematics II (graduate), Spring 2017
- MATH 635: Optimization (graduate), Fall 2018
- MATH 424/624: Ordinary Differential Equation, Fall 2016
- Workshop ○ Becoming a Mentor, MARC, UTSA, 2022
- Blackboard Assessment Best Practices, Academic Innovation, UTSA, 2022
- Innovation Academy by Academic Innovation, UTSA, Summer 2021
- Academic Integrity & Proctoring, UTSA, 2021
- “Ready, Prep, Teach!”, The Center for Engaged Learning and Teaching (CELT), Tulane University, Spring 2019

Mentoring Experience

- Semester project ○ Assist in mentoring topic course project, on modeling Wolbachia transmission in Anopheles mosquitoes for Malaria control (Tulane, 2021 Spring - 2022 Spring)
- Assist in mentoring topic course project, on modeling Gonorrhea dynamics and interventions on networks (Tulane, 2021 Spring)
- Doctoral Dissertation ○ Assist in mentoring doctoral dissertation, Mathematics student, on modeling epidemics with distribution parameters, committee member for Dissertation defense (Tulane, 2017-2019)
- Assist in mentoring doctoral dissertation, Biostatistics student, on characterizing the spread of epidemics over networks (Tulane, 2018-2020)
- Assist in mentoring doctoral dissertation, Public Health student, on quantifying human-mosquito contact rate, paper published (Tulane, 2017-2018)
- Master Thesis ○ Assist in mentoring master thesis project, Computational Science student, on modeling chikungunya disease and quantifying model uncertainty (Tulane, 2018-2019)
- Assist in mentoring master project, Computational Science student, on modeling the Chagas disease in the New Orleans area and estimating human risk. (Tulane, 2018-2020)
- Honor Thesis ○ Assist in mentoring undergraduate honor thesis, Neuroscience student, on modeling Tuberculosis progression with treatment, Senior Scholar Award for undergraduate (Tulane, 2018-2019)
- Assist in mentoring undergraduate honor thesis, Mathematics student, on characterizing the stochastic spread of epidemics over networks (Tulane, 2018-2020)
- Conference Mentor at Society of Mathematical Biology annual meeting 2017 and 2020

Computer Skills

- Script Matlab, Octave, Fortran, Mathematica, C, R, Python, Maple, MySQL, NetLogo
- Software Latex, Git, Vim, Inkscape, Gephi, ParaView, Adobe Illustrator, Origin

Other MPI, PETSc, LaGriT, PFLOTRAN