# Zhuolin Qu

## Curriculum Vitae

University of Texas at San Antonio Department of Mathematics ⊠ zhuolin.qu@utsa.edu 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 (\*authors in alphabetical order)

- Published 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,
  - o Kurganov, A., Rozanova, O. S., Qu, Zhuolin\*, and Wu, T. Adaptive Moving Mesh Central-Upwind Schemes for Hyperbolic System of PDEs. Applications to Compressible Euler Equations and Granular Hydrodynamics, Accepted to Communications on Applied Mathematics and Computation

- 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.
- 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)
- 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.

Under Review

- Qu, Zhuolin, Azizi, A., Schmidt, N., Craig-Kuh, M. C., Stoecker, C., Hyman, J. M., and Kissinger, P. The Effect of Screening Young Men for Chlamydia Trachomatis on the Rates among Women: A Network Modelling Study for Highprevalence Communities. Submitted to BMJ Open in 09/2020, revised
- Azizi, A., Qu, Zhuolin, Lewis, B., and Hyman, J. M. Generating a Heterosexual Bipartite Network Embedded in Social Network. Submitted to Applied Network Science Special Issue on Epidemics, 09/2020
- Azizi, A., Dewar, J., Qu, Zhuolin, and Hyman, J. M. Using an Agent-based Sexual-network Model to Guide Mitigation Efforts for Controlling Chlamydia. Submitted to Epidemics, revised, 09/2020
- 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. Submitted to STD, 09/2020
- 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. Submitted to Mathematical Biosciences and Engineering, special issue, 09/2020

## Papers in Preparation (drafts available on request)

- Qu, Zhuolin, Gulbudak, H., Hyman, J. M., and Milner, F. Sensitivity Analysis in a Vector-Host Immuno-Epidemiological Model with Application to Rift Valley Fever
- Kurganov, A., Qu, Zhuolin\*, and Wu, T. Well-Balanced Adaptive Moving Mesh Central-Upwind Schemes for the Saint-Venant Systems of Shallow Water Equations

### Honors and Awards

- 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 SIAM Texas-Louisiana Sectional Meeting, Mini-symposium talk, Southern Methodist University, 11/2019
  - Mathematics and Statistics Colloquium, Georgia State University, 10/2019
  - o Population Health Science Seminar, School of Public Health, Georgia State University, 10/2019
  - o Seventh International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems (ICMA VII), Mini-symposium talk, Arizona State University, 10/2019
  - o Biostatistics Colloquium, Louisiana State University Health Sciences Center, 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
  - Mathematics Colloquium, University of Louisiana at Lafayette, 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
  - Mathematical Biology Center, Guangzhou University, 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

• Applied Mathematics Seminar, Tulane Mathematics Department, 04/2014

## Talks

- Contributed o 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
  - o Biomathematics and Ecology: Education and Research, Arizona State University, 10/2018
  - SIAM Annual Meeting 2018, Portland, OR, 07/2018
  - o 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
  - o 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

- Mathematics Research Communities, "Dynamics of Infectious Diseases: Ecological Models Across Multiple Scales", 06 - 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
- o Joint Research Conference on Statistics in Quality, Industry, and Tech**nology**, Santa Fe, 06/2018
- o 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

Journal of Biological Dynamics, PLoS ONE, Journal of Theoretical Biology, Mathe-Referee matical Biosciences, Letters in Biomathematics, Journal of Biological Systems

- Organizer 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

Co-organizer Clifford Lectures, Tulane University, 2017

Coverage

- Media Math Horizons, Evelyn J. Lamb, "Fighting an Epidemic with an Epidemic", Math Horizons, 2019, 26:4, 22-23, DOI: 10.1080/10724117.2019.1574148
  - o Forbes Magazine, Innovation-Science, "Math-Based Mosquito Control To Prevent Human Diseases", January 14th, 2019
  - o 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
  - o 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
  - o SIAM Texas-Louisiana Sectional Meeting, 2019

Newcomb 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

of Record

- Instructor MAT 1193: Calculus for Biosciences, Fall 2020, online
  - o MATH 758: Scientific Computation III (graduate), Spring 2018, Spring 2019
  - o MATH 731: Applied Mathematics (graduate), Spring 2020
  - o MATH 221: Calculus III, Fall 2016
  - o MATH 122: Calculus II, Fall 2013
  - MATH 116: Long Calculus II, Spring 2014

Teaching • MATH 309/609: Linear Algebra, Fall 2012, Spring 2013

Assistant

- o MATH 224: Introduction to Applied Mathematics, Spring Fall 2012, Spring 2015
- o MATH 131: Consolidated Calculus, Fall 2014
- o MATH 221: Calculus III, Spring 2012
- o MATH 122: Calculus II, Spring 2016
- o MATH 121: Calculus I, Fall 2011, Fall 2015

Guest • MATH 732: Applied Mathematics II (graduate), Spring 2017

Teaching

o MATH 635: Optimization (graduate), Fall 2018

Lectures

o MATH 424/624: Ordinary Differential Equation, Fall 2016

"Ready, Prep, Teach!", The Center for Engaged Learning and Teaching (CELT), Workshop Tulane University, Spring 2019

### Mentoring Experience

## Dissertation

- Doctoral o 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, manuscript submitted. (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