

# Zhuolin Qu

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📄 <https://zhuolinqu.github.io>

## Research Interests

Mathematical and Computational Epidemiology, Numerical Methods for Time-Dependent PDEs, Uncertainty Quantification, Optimization Algorithms

## Education

### Doctor of Philosophy, Applied Mathematics

*Tulane University, 3.98*

Thesis: Fast Operator Splitting Methods for Nonlinear PDEs

Advisor: Professor Alexander Kurganov

**New Orleans, LA**

2011–2016

### Master of Science, Statistics

*Tulane University, 4.00*

Advisor: Professor Michelle Lacey

**New Orleans, LA**

2012–2016

### Bachelor of Science, Mathematics

*University of Science and Technology of China*

Advisor: Professor Mengping Zhang

**Heifei, China**

2007–2011

## Experience

### Postdoctoral Fellow, Tulane University

*Mentor: James (Mac) Hyman*

**New Orleans, LA**

2016–present

- Work in multi-disciplinary team (public health, mathematics, statistics) to model infectious diseases, including vector-borne diseases and sexually transmitted diseases
- Propose and analyze both equation-based models and stochastic network-based models to study disease dynamics and optimize the mitigation resources

### Visiting Scholar, Los Alamos National Laboratory

*Host: Benjamin McMahon*

**Los Alamos, NM**

summer 2017, 2018

- Performed epidemiological analysis on invasive non-typhoidal Salmonella(iNTS) in sub-Saharan Africa
- Proposed agent-based multi-scale model describing host-pathogen interactions, risk factors for host susceptibility and family structure in disease transmission

### Graduate Research Assistant, Tulane University

*Mentor: Alexander Kurganov*

**New Orleans, LA**

2012–2016

- Addressed numerical challenges for fluid dynamic systems, including hyperbolic systems of conservation laws, phase-field models and the modified Buckley-Leverett equations
- Designed highly efficient and stable numerical algorithms using finite-difference/finite-volume methods, operator splitting methods and pseudo-spectral methods

### Summer Intern, Los Alamos National Laboratory

*Mentor: Carl Gable, Nataliia Makedonska*

**Los Alamos, NM**

summer 2015

- Improved algorithms for calculating geometric coefficients of large unstructured mesh
- Independently implemented the algorithms using highly efficient parallel programming (in PETSc and MPI) and object-oriented programming in Fortran
- Codes are now part of dfnWorks, the software suit of flow and transport modeling in discrete fracture networks, used by the lab

### Visiting Fellow, Shanghai Jiao Tong University

*Institute of Natural Sciences*

**Shanghai, China**

summer 2012, 2013

**Summer Intern**, Pohang University of Science and Technology

**Pohang, Korea**

Mentor: Kwang Ik Kim

summer 2010

Worked on the Singular Perturbation Theory in Combinatorial and Computational Mathematics (Com2MaC)  
Research Center of POSTECH

## Publications

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- **Qu, Zhuolin**, Xue, L., 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.
- *with* Kurganov, A., Wu, T. Adaptive Moving Mesh Central-Upwind Schemes for Hyperbolic System of PDEs. Applications to Compressible Euler Equations and Granular Hydrodynamics, submitted
- *with* Cheng, Y. Z., Kurganov, A., Tang, T. Fast and Stable Explicit Operator Splitting Methods for Phase-field Models, *Journal of Computational Physics*, 2015, 303:45-65.
- *with* Kao, C. Y., Kurganov, A., Wang, Y. A Fast Explicit Operator Splitting Method for Modified Buckley–Leverett Equations, *Journal of Scientific Computing*, 2015, 64(3):837-857.
- *with* Chertock, A., Kurganov, A., Wu, T. Three-Layer Approximation of Two-Layer Shallow Water Equations, *Mathematical Modelling and Analysis*, 2013, 18(5):675-693.

## Papers in Preparation

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- **Qu, Zhuolin**, Hyman, J. M. Reducing Mathematical Models for *Wolbachia* Transmission in Mosquitoes to Control Mosquito-borne Diseases
- Thongsripong, P., **Qu, Zhuolin**, Yukich, J., Hyman, J. M., Wesson, D. Quantification of Human-mosquito Contact Rate Using Surveys and its Application in Determining Dengue Viral Transmission Risk
- Azizi, A., **Qu, Zhuolin**, Schmidt, N., Kissinger, P., Hyman, J. M. Modeling the Impact of Chlamydia Screening of Young African American Men and Expedited Index and Partner Treatment on the Rates Among Women

## Honors and Awards

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<b>Postdoctoral Fellow Travel Fund</b> , Tulane University	2017–2018
<b>Health Sciences Research Days Award for Excellence in Research and Presentation</b> by a Postdoctoral Fellow, Tulane University	2017
<b>SAMSI Workshop Travel Award</b> , SAMSI	2016
<b>KI-Net Conference Travel Award</b> , KI-Net	2015
<b>Graduate Studies Student Association Travel Award</b> , Tulane University	2015
<b>Tulane Science and Engineering Dean’s Office Travel Award</b> , Tulane University	2015
<b>Summer Research Fellowship</b> , Tulane University	2012–2015
<b>Outstanding Students Fellowship</b> , University of Science and Technology of China	2008–2010
<b>Special Freshmen Fellowship</b> , University of Science and Technology of China	2007

## Conference and Talks

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### 2018.....

- **University of Louisiana at Lafayette**, Mathematics Department Colloquium, October
- **Biomathematics and Ecology: Education and Research (BEER)** conference, contributed talk, Arizona State University, October
- **SAMSI workshop**, Model Uncertainty: Mathematical and Statistical, poster presentation, Duke University, August
- **SIAM Annual Meeting 2018**, contributed talk, July
- **Los Alamos National Laboratory**, Brown bag meeting on disease transmission modeling and surveillance, seminar talk, July
- **Joint Research Conference on Statistics in Quality, Industry, and Technology**, participation, Santa Fe, June
- **MBI Emphasis Workshop on Multiscale Dynamics of Infections**, poster presentation, Ohio State University, April
- **NIH-MIDAS Network Meeting**, poster presentation, April
- **42nd SIAM SEAS Sectional Conference**, invited talk, UNC Chapel Hill, March
- **29th Annual Health Sciences Research Days**, poster presentation, Tulane University, February
- **Scientific Computing around Louisiana (SCALA)**, contributed talk, Louisiana State University, February

### 2017.....

- **Mathematical Biology Center**, Guangzhou University, invited talk, November
- **Mathematics and Science College**, Shanghai Normal University, invited talk, November
- **Tropical Medicine Seminar**, School of Public Health and Tropical Medicine, Tulane, seminar talk, September
- **Los Alamos National Laboratory**, Center for Nonlinear Studies, seminar talk, August
- **9th Annual Summer Institute in Statistics and Modeling in Infectious Diseases**, workshop, University of Washington, July
- **SMB Annual Meeting 2017**, poster presentation, July
- **SIAM Annual Meeting 2017**, contributed talk, July
- **NIMBioS Tutorial: Uncertainty Quantification for Biological Models**, workshop, June
- **NIH-MIDAS Network Meeting**, poster presentation, May
- **How Mathematical Models are helping Guide Mitigation Efforts to Control Epidemics**, guest lecture, Georgia State University, May
- **Scientific Computing around Louisiana (SCALA)**, contributed talk, Tulane University, March
- **SIAM Conference on Computational Science and Engineering**, poster presentation, March
- **28th Annual Health Sciences Research Days**, poster presentation, Tulane University, February

### 2016.....

- **SAMSI Optimization Program Summer School**, workshop, August

### 2015.....

- **KI-Net: Collective Dynamics in Biological and Social Systems**, poster presentation, November

- **Tulane Mathematics Department**, Graduate Student Colloquium, invited talk, September
- **Los Alamos National Laboratory**, SFT Brown Bag Seminar, invited talk, August
- **Student Symposium: “Championing Scientific Careers”**, poster presentation, Los Alamos National Laboratory, August
- **The Ninth IMACS International Conference** on Nonlinear Evolution Equations and Wave Phenomena, invited talk, April
- **Scientific Computing Around Louisiana (SCALA)**, poster presentation, March

2014.....

- **Tulane Mathematics Department**, applied mathematics seminar, invited talk, April
- **KI-Net Conference** on Modern Perspectives in Applied Mathematics: Theory and Numerics of PDEs, participation, April

before.....

- **Clifford Lectures Conference** on Numerical Methods for Convection Dominated Partial Differential Equations, participation, March 2013
- **American Mathematical Society Sectional Meeting**, participation, October 2012

## Professional Service

Journal Referee.....

- Journal of Biological Dynamics ◦ PLoS ONE
- Journal of Theoretical Biology ◦ Mathematical Biosciences

Graduate Oral Exam Committee.....

- Li Guan, Department of Mathematics, Tulane University, Spring 2018

**Poster Judge**, School of Science and Engineering Research Day, Tulane University 2018

**Co-organizer**, Clifford Lectures Conference 2017, Tulane University 2017

**Newcomb Fellow**, Newcomb College Institute, Tulane University 2016–present

## Teaching Experience

Instructor.....

Scientific Computation III (graduate course) Spring 2018

Calculus III Fall 2016

Long Calculus II Spring 2014

Calculus II Fall 2013

Teaching Assistant.....

Calculus II Spring 2016

Calculus I Fall 2015

Introduction to Applied Mathematics Spring 2015

Consolidated Calculus Fall 2014

Linear Algebra Spring 2013

Linear Algebra	Fall 2012
Introduction to Applied Mathematics	Fall 2012
Introduction to Applied Mathematics	Spring 2012
Calculus III	Spring 2012
Calculus I	Fall 2011

### Guest Teaching Lectures.....

Optimization (graduate course)	Fall 2018
Applied Mathematics II (graduate course)	Spring 2017
Ordinary Differential Equation	Fall 2016

### Computer skills

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**Script:** Matlab, Octave, Fortran, Mathematica, C, R, Python, Maple, MySQL, NetLogo

**Software:** Latex, Git, Vim, Inkscape, ParaView, Adobe Illustrator, Origin

**Other:** MPI, PETSc, LaGriT, PFLOTRAN