Tong Wu

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Department of Mathematics
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Research Interests

Numerical Analysis; Scientific Computing; Numerical Methods for Time–Dependent PDEs; Hyperbolic Conservation Laws; Shallow Water Models; Adaptive Moving Mesh Methods; Network Generation Algorithm; Data Assimilation.

Education

2011–2016 **Ph.D. Mathematics**, *Tulane University*
Advisor: Alexander Kurganov

2007–2011 **B.S. Mathematics and Applied Mathematics**, *Xi'an Jiaotong University*

Academic Experience

2020–present **Assistant Professor in Practice**, *Department of Mathematics, University of Texas at San Antonio.*

2018–2020 **Postdoctoral Fellow**, *Department of Mathematics, Tulane University*
Mentor: James M. Hyman

2018–2019 (summer) **Visiting Scholar**, *Los Alamos National Laboratory*
Applied Mathematics and Plasma Physics Group (T5)
Host: Vitaliy Gyrya, Humberto Godinez

2016–2018 **Postdoctoral researcher**, *North Carolina State University*
Mentor: Alina Chertock, Zhilin Li

2017 summer **Visiting Scholar**, *Los Alamos National Laboratory*
Applied Mathematics and Plasma Physics Group (T5)
Host: Konstantin Lipnikov

2015–2016 **Graduate Research Assistant**, *Tulane University*
Advisor: Alexander Kurganov

2015 summer **Visiting Fellow**, *Institute of Mathematics in Bordeaux and Inria*
Host: Mario Ricchiuto

2012–2013 (summer) **Visiting Fellow**, *Shanghai Jiaotong University*
Institute of Natural Sciences

Publications and Preprints(*authors in alphabetical order)

Published

- Alina Chertock, A. Kurganov, Xin Liu, Yongle Liu and **Tong Wu***, *Well-Balancing Via Flux Globalization: Applications to Shallow Water Equations with Wet/Dry Fronts*, Journal of Scientific Computing, 90, Article number: 9 (2022).
- Alina Chertock, Alexander Kurganov,and **Tong Wu***, *Operator Splitting Based Central-Upwind Schemes for Shallow Water Equations with Moving Bottom Topography*, Communications in Mathematical Sciences 18.8 (2020): 2149-2168.
- Xin Liu, Xi Chen, Shi Jin, Alexander Kurganov, **Tong Wu** and Hui Yu, *Moving–Water Equilibria Preserving Partial Relaxation Scheme for the Saint-Venant System*, SIAM Journal on Scientific Computing 42.4 (2020): A2206-A2229.
- Alexander Kurganov, Zhuolin Qu, Olga S. Rozanova, and **Tong Wu***, *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 (2020): 1-35.
- **Tong Wu**, Mikhail J. Shashkov, Nathaniel Morgan, Hong Luo and Dmitri Kuzmin, *An updated Lagrangian discontinuous Galerkin hydrodynamic method for gas dynamics*, Computers & Mathematics with Applications 78.2 (2019): 258-273.
- Yuanzhen Cheng, Alina Chertock, Michael Herty, Alexander Kurganov, and **Tong Wu***, *A New Approach for Designing Moving-Water Equilibria Preserving Schemes for the Shallow Water Equations*, Journal of Scientific Computing 80.1 (2019): 538-554.
- Alina Chertock, Alexander Kurganov, Mario Ricchiuto, and **Tong Wu***, *Adaptive Moving Mesh Upwind Scheme for the Two-Species Chemotaxis Model*, Computers & Mathematics with Applications 77.12 (2019): 3172-3185.
- Asma Azizi, Jeremy Dewar, **Tong Wu**, and James M. Hyman, *Generating Bipartite Networks with a Prescribed Joint Degree Distribution*, Journal of complex networks 5.6 (2017): 839-857.
- Alexander Kurganov, Martina Prugger, and **Tong Wu***, *Second-Order Fully Discrete Central-Upwind Scheme for Two-Dimensional Hyperbolic Systems of Conservation Laws*, Siam Journal on Scientific Computing 39.3 (2017): A947-A965.
- Alina Chertock, Shumo Cui, and Alexander Kurganov, and **Tong Wu***, *Steady State and Sign Preserving Semi-Implicit Runge-Kutta Methods for ODEs with Stiff Damping Term*, SIAM Journal on Numerical Analysis, 53 (2015), 2008-2029.
- Alina Chertock, Shumo Cui, Alexander Kurganov, and **Tong Wu***, *Well-Balanced Positivity Preserving Central-Upwind Scheme for the Shallow Water System with Friction Terms*, International Journal for Numerical Methods in Fluids, 78 (2015), 355-383.
- Alina Chertock, Alexander Kurganov, Zhuolin Qu, and **Tong Wu***, *On a Three-Layer Approximation of Two-Layer Shallow Water Equations*, Mathematical Modelling and Analysis, 18 (2013), 675-693.

Submitted

- Zhuolin Qu, **Tong Wu**, and James M. Hyman, *Modeling spatial waves of Wolbachia invasion for controlling mosquito-borne diseases*, submitted to SIAM Jounrnal on Applied Mathematics.
- Alina Chertock, Alexander Kurganov, **Tong Wu***, and Jun Yan, *Well-Balanced Numerical Method for Atmospheric Flow Equations with Gravity*, submitted to Communications in Computational Physics.
- Alexander Kurganov, Zhuolin Qu, and **Tong Wu***, *Well-Balanced Positivity Preserving Adaptive Moving Mesh Central-Upwind Schemes for the Saint-Venant System*, submitted to ESAIM Mathematical Modelling and Numerical Analysis.

Projects in Preparation

- *Continuous Data Assimilation from Scattered Spatial Observations in Time Dependent PDEs*, with James M. Hyman, Humberto C. Godinez and Vitaliy Gyrya, in preparation.
- *Modeling Shallow Water Flows through Solid Obstacles with Windows*, with Suncica Canic, Alina Chertock, Shumo Cui, Alexander Kurganov, Abdolmajid Mohammadian and Xin Liu, in preparation.

Conferences and Presentations

Invited Talks

- **SIAM Texas-Louisiana Section**,virtual conference hosted by Texas A&M University, (Oct 2020)
- **SIAM Conference on Computational Science and Engineering**, Spokane, WA (Feb 2019)
- **Applied Mathematics Seminar**, University of Louisiana at Lafayette (Oct 2018)
- **SIAM Texas-Louisiana Section**, Louisiana State University (Oct 2018)
- **42nd SIAM Southeastern Atlantic Sectional Conference**, University of North Carolina at Chapel Hill (March 2018)
- **SIAM Central States Section**, Colorado State University (Sept 2017)
- **Los Alamos National Laboratory**, Applied Mathematics and Plasma Physics Seminar, Center for Nonlinear Studies (July 2017)
- **The International Congress on Industrial and Applied Mathematics**, Beijing, China. (August 2015)

Contributed Talks

- **SIAM Texas-Louisiana Section**, Southern Methodist University (Nov 2019)
- **SIAM Southeastern Atlantic Section**, University of Tennessee–Knoxville (Sept 2019)
- **Scientific Computing Around Louisiana**, Tulane University (Feb 2019)
- **SIAM Annual Meeting 2018**, Portland, OR (July 2018)
- **SIAM Conference on Analysis of PDEs**, Scottsdale, AZ (Dec 2015)

- **The 9th International Conference on Nonlinear Evolution Equations and Wave Phenomena**, University of Georgia (April 2015)
- **Scientific Computing Around Louisiana**, Tulane University (March 2015)

Posters

- **SIAM Texas-Louisiana Section**, UTRGV, South Padre Island, Texas, (Nov 2021)
- **Model Uncertainty: Mathematical and Statistical**, SAMSI workshop, Duke University (August 2018)
- **Scientific Computing Around Louisiana**, Tulane University (Jan 2018)
- **International Conference on Current Trends and Challenges in Numerical Solution of Partial Differential Equations**, Purdue University (July 2017)
- **Collective Dynamics in Biological and Social Systems**, Duke University (Nov 2015)

Workshop Conferences

- **Numerical Methods for Shallow Water Equations and Related Models**, Southern University of Science and Technology, China (Dec 2017)
- **The 9th International Conference on Numerical Methods for Multi-Material Fluid Flow**, Santa Fe, NM (Sept 2017)
- **Uncertainty Quantification for Biological Models**, University of Tennessee (June 2017)
- **Clifford Lecture**, Tulane University (April 2017, Nov 2013)
- **Young Researchers Workshop: Stochastic and Deterministic Methods in Kinetic Theory**, Duke University (Nov 2016)
- **KI-Net Conference** on Modern Perspectives in Applied Mathematics: Theory and Numerics of PDEs, Bethesda, MD (April 2014)

Teaching and Mentoring Experience

Instructor (UTSA)

- 2022 Spring: Calculus II
- 2021 Fall: Calculus III
- 2021 Spring: Calculus II
- 2020 Fall: Calculus I

(Tulane)

- 2020 Spring: Scientific Computing I
- 2019 Spring: Scientific Computing I
- 2014 Spring: Calculus III
- 2013 Fall: Statistics for Business

(NCSU)

- 2018 Spring: Calculus III
- 2017 Fall: Calculus I
- 2017 Spring: Calculus III
- 2016 Fall: Calculus II

Teaching Assistant (Tulane)
- 2014 Fall: Calculus
- 2013 Spring: Introduction to Applied Mathematics
- 2012 Fall: Introduction to Applied Mathematics, Linear Algebra
- 2012 Spring: Linear Algebra
- 2011 Fall: Calculus, Statistics for Business

Mentor
- Assist in mentoring master thesis project, optimization algorithms and visualization (Tulane, 2019-2020)
- Assist in mentoring doctoral dissertation, Mathematics student, on numerical techniques for hydrodynamic and morphodynamic modeling (NCSU, 2017-2018)

Service

Journal Referee: SIAM Journal on Applied Mathematics, Journal of Computational Physics, Applied Numerical Mathematics

UTSA: 2020 - Present Committee Member, Website committee, Department of Mathematics at UTS

2021 Committee Member, MAT 1224 Course Coordination, UTSA

2021 Committee Member, FTT Promotion, Department of Mathematics at UTSA

2020 Committee Member, MAT 1214 Course Coordination, UTSA

Poster Judge: SIAM Texas-Louisiana Section, 2019

Funding Support and Awards

2019: Postdoctoral Fellow Travel Fund, Tulane University

2015 Aug: SIAM Travel Support for ICIAM 2015

2015-2016: NSF Research Assistantship, supported by Dr. Alexander Kurganov, Tulane

2013-2015: Summer Research Support, Tulane University