NAN JIANG

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https://people.clas.ufl.edu/jiangn/

EMPLOYMENT

Assistant Professor (Tenure-Track)

August 2020 - present

 $Department\ of\ Mathematics$

University of Florida, Gainesville, FL, USA

Assistant Professor (Tenure-Track)

August 2016 - August 2020

Department of Mathematics and Statistics

Missouri University of Science and Technology, Rolla, MO, USA

(formerly University of Missouri, Rolla)

Postdoctoral Associate Researcher

January 2015 - July 2016

Department of Scientific Computing

Florida State University, Tallahassee, FL, USA

Advisor: Professor Max Gunzburger

Givens Associate

May 27 - July 31, 2014

Mathematics and Computer Science Division Argonne National Laboratory, Argonne, IL, USA

EDUCATION

Ph.D. Mathematics

August 2010 - December 2014

University of Pittsburgh, Pittsburgh, PA, USA

Advisor: Professor William Layton

B.S. Information & Computing Science

Xi'an Jiaotong University, Xi'an, Shanxi, China

September 2006 - July 2010

July 2010

Minor Diploma in Finance

Xi'an Jiaotong University, Xi'an, Shanxi, China

RESEARCH INTEREST

- Computational Fluid Dynamics and Numerical Analysis: Navier-Stokes Equations
- Turbulence Modeling and Simulations
- Ensemble Simulation Models and Algorithms
- Reduced Order Modeling: Proper Orthogonal Decomposition
- Nonlocal Models for Anomalous Diffusion: Fractional Laplacian
- Uncertainty Quantification

Grants

- (sole PI) National Science Foundation (NSF), DMS-2143331, CAREER: New Algorithms and Models for Turbulence in Incompressible Fluids, \$462,779, August 1, 2022 July 31, 2027.
- (sole PI) National Science Foundation (NSF), DMS-1720001 (transferred to UF, DMS-2120413), Efficient Ensemble Methods for Predictive Fluid Flow Simulations Subject to Uncertainty, \$149,938, July 1, 2017 - August 31, 2021.
- (sole PI) University of Missouri Research Board (UMRB), Efficient Ensemble Methods for Predictive Simulations of the Boussinesq Systems Subject to Uncertainty, \$5,000, June 1, 2017 May 31, 2018.

- 31. J. Carter, D. Han and N. Jiang. Second Order, Unconditionally Stable, Linear Ensemble Algorithms for the Magnetohydrodynamics Equations, Journal of Scientific Computing, 94 (2023), 41.
- 30. N. Jiang and H. Yang. Fast and Accurate Artificial Compressibility Ensemble Algorithms for Computing Parameterized Stokes-Darcy Flow Ensembles, Journal of Scientific Computing, 94 (2023), 17.
- 29. R. Cao, N. Jiang and H. Yang. Three Linear, Unconditionally Stable, Second Order Decoupling Methods for the Allen-Cahn-Navier-Stokes Phase Field Model, Journal of Mathematical Analysis and Applications, 519 (2023), 126792.
- 28. N. Jiang and H. Yang. Numerical Investigation of Two Second-Order, Stabilized SAV Ensemble Methods for the Navier-Stokes Equations, Advances in Computational Mathematics, 48 (2022), 65.
- N. Jiang, Y. Li and H. Yang. A Second Order Ensemble Method with Different Subdomain Time Steps for Simulating Coupled Surface-Groundwater Flows, Numerical Methods for Partial Differential Equations, 38 (2022), 1880-1907.
- J. Carter and N. Jiang. Numerical Analysis of A Second Order Ensemble Method for Evolutionary Magnetohydrodynamics Equations at Small Magnetic Reynolds Number, Numerical Methods for Partial Differential Equations, 38 (2022), 1407-1436.
- 25. N. Jiang, A. Takhirov and J. Waters. Robust SAV-Ensemble Algorithms for Parametrized Flow Problems with Energy Stable Open Boundary Conditions, Computer Methods in Applied Mechanics and Engineering, 392 (2022), 114709.
- N. Jiang and C. Qiu. Numerical Analysis of A Second Order Ensemble Algorithm for Numerical Approximation of Stochastic Stokes-Darcy Equations, Journal of Computational and Applied Mathematics, 406 (2022), 113934.
- 23. N. Jiang and H. Yang. SAV Decoupled Ensemble Algorithms for Fast Computation of Stokes-Darcy Flow Ensembles, Computer Methods in Applied Mechanics and Engineering, 387 (2021), 114150.
- 22. N. Jiang and H. Yang. Stabilized Scalar Auxiliary Variable Ensemble Algorithms for Parameterized Flow Problems, SIAM Journal on Scientific Computing, 43 (2021), A2869-A2896.
- 21. N. Jiang, Y. Li and H. Yang. An Artificial Compressibility Crank-Nicolson Leap-Frog Method for the Stokes-Darcy Model and Application in Ensemble Simulations, SIAM Journal on Numerical Analysis, 59 (2021), 401-428.
- 20. N. Jiang, W. Layton, M. McLaughlin, Y. Rong and H. Zhao. On the Foundations of Eddy Viscosity Models of Turbulence, Fluids, 5 (2020), 167.
- 19. D. Han and N. Jiang. A Second Order, Linear, Unconditionally Stable, Crank-Nicolson-Leapfrog Scheme for Phase Field Models of Two-Phase Incompressible Flows, Applied Mathematics Letters, 108 (2020), 106521.
- 18. X. He, N. Jiang and C. Qiu. An Artificial Compressibility Ensemble Algorithm for a Stochastic Stokes-Darcy Model with Random Hydraulic Conductivity and Interface Conditions, International Journal for Numerical Methods in Engineering, 121 (2020), 712-739.
- 17. N. Jiang. A Pressure-Correction Ensemble Scheme for Computing Evolutionary Boussinesq Equations, Journal of Scientific Computing, 80 (2019), 315-350.
- 16. N. Jiang and C. Qiu. An Efficient Ensemble Algorithm for Numerical Approximation of Stochastic Stokes-Darcy Equations, Computer Methods in Applied Mechanics and Engineering, 343 (2019), 249-275.
- 15. M. Gunzburger, N. Jiang and Z. Wang. A Second-Order Time-Stepping Scheme for Simulating Ensembles of Parameterized Flow Problems, Computational Methods in Applied Mathematics, 19 (2019), 681-701.

- 14. M. Gunzburger, N. Jiang and Z. Wang. An Efficient Algorithm for Simulating Ensembles of Parameterized Flow Problems, IMA Journal of Numerical Analysis, 39 (2019), 1180-1205.
- 13. N. Jiang and M. Schneier. An Efficient, Partitioned Ensemble Algorithm for Simulating Ensembles of Evolutionary MHD Flows at Low Magnetic Reynolds Number, Numerical Methods for Partial Differential Equations, 34 (2018), 2129-2152.
- 12. M. Gunzburger, N. Jiang and F. Xu. Analysis and Approximation of A Fractional Laplacian-Based Closure Model for Turbulent Flows and Its Connection to Richardson Pair Dispersion, Computers and Mathematics with Applications, 75 (2018), 1973-2001.
- 11. M. Gunzburger, N. Jiang and M. Schneier. A Higher-Order Ensemble/Proper Orthogonal Decomposition Method for the Nonstationary Navier-Stokes Equations, International Journal of Numerical Analysis and Modeling, 15 (2018), 608-627.
- 10. M. Gunzburger, N. Jiang and M. Schneier. An Ensemble-Proper Orthogonal Decomposition Method for the Nonstationary Navier-Stokes Equations, SIAM Journal on Numerical Analysis, 55 (2017), 286-304.
- N. Jiang. A Second Order Ensemble Method Based On A Blended BDF Timestepping Scheme for Time Dependent Navier-Stokes Equations, Numerical Methods for Partial Differential Equations, 33 (2017), 34-61.
- 8. N. Jiang, M. Mohebujjaman, L. Rebholz and C. Trenchea. An Optimally Accurate Discrete Regularization for Second Order Timestepping Methods for Navier—Stokes Equations, Computer Methods in Applied Mechanics and Engineering, 310 (2016), 388-405.
- 7. N. Jiang and W. Layton. Algorithms and Models for Turbulence Not At Statistical Equilibrium, Computers and Mathematics with Applications, 71 (2016), 2352-2372.
- 6. N. Jiang and H. Tran. Analysis of A Stabilized CNLF Method with Fast Slow Wave Splittings for Flow Problems, Computational Methods in Applied Mathematics, 15 (2015), 307-330.
- 5. N. Jiang, M. Kubacki, W. Layton, M. Moraiti and H. Tran. A Crank-Nicolson Leapfrog Stabilization: Unconditional Stability and Two Applications, Journal of Computational and Applied Mathematics, 281 (2015), 263-276.
- 4. N. Jiang, S. Kaya and W. Layton. Analysis of Model Variance for Ensemble Based Turbulence Modeling, Computational Methods in Applied Mathematics, 15 (2015), 173-188.
- 3. N. Jiang. A Higher Order Ensemble Simulation Algorithm for Fluid Flows, Journal of Scientific Computing, 64 (2015), 264-288.
- 2. N. Jiang and W. Layton. Numerical Analysis of Two Ensemble Eddy Viscosity Numerical Regularizations of Fluid Motion, Numerical Methods for Partial Differential Equations, 31 (2015), 630-651.
- 1. N. Jiang and W. Layton. An Algorithm for Fast Calculation of Flow Ensembles, International Journal for Uncertainty Quantification, 4 (2014), 273-301.

Papers In Press

• N. Jiang and H. Yang. Artificial compressibility SAV ensemble algorithms for the incompressible Navier-Stokes equations, accepted in Numerical Algorithms, in press, 2023.

Manuscripts Submitted

- N. Jiang and H. Yang. A Second Order Ensemble Algorithm for Computing the Navier-Stokes Equations, submitted to Journal of Mathematical Analysis and Applications, in review, 2023.
- N. Jiang and H. Yang. Unconditionally Stable, Second Order, Decoupled Ensemble Schemes for Computing Evolutionary Boussinesq Equations, submitted to Applied Numerical Mathematics, in review, 2023.

- Workshop on Advances in Scientific Computing and Applied Mathematics Hilton Riverside, New Orleans, LA (rescheduled due to COVID)
- Department Colloquium, Department of Mathematics University of Florida, Gainesville, FL, Feb 10, 2020
- Special Session on Fluid Dynamics: From Theory To Numerics AMS Fall Western Sectional Meeting University of California Riverside, Riverside, CA, Nov 9, 2019
- Minisymposium on Advances in Numerical Methods and Modeling of Fluid Flow Conference on Computational Mathematics and Applications University of Nevada, Las Vegas, NV, Oct 27, 2019
- Workshop on Time Filters and Predictive Accuracy University of Pittsburgh, Pittsburgh, PA, May 30, 2019
- Minisymposium on Recent Advances of Numerical Methods in Fluid Mechanics with Applications
 The 4th Annual Meeting of SIAM Central States Section
 The University of Oklahoma, Norman, OK, Oct 6, 2018
- Minisymposium on Synergy of Design, Analysis, and Computations in Fluid Flow Dynamics SIAM Annual Meeting
 David Lawrence Convention Center, Pittsburgh, PA, July 14, 2017
- Minisymposium on Monte Carlo and Ensemble Methods for Uncertainty Quantification SIAM Conference on Computational Science and Engineering (SIAM-CSE)
 Hilton Atlanta, Atlanta, GA, Feb 27, 2017
- Special Session on Above and Beyond Fluid Flow Studies AMS Fall Western Sectional Meeting University of Denver, Denver, CO, Oct 8, 2016
- Minisymposium on Recent Advances in Fractional PDEs
 2nd Annual Meeting of SIAM Central States Section
 University of Arkansas at Little Rock, Little Rock, AR, Oct 1, 2016
- Workshop on Numerical Analysis and Predictability of Fluid Motion University of Pittsburgh, Pittsburgh, PA, May 3, 2016
- Department Colloquium, Department of Mathematics and Statistics Missouri University of Science and Technology, Rolla, MO, March 25, 2016
- Minisymposium on Recent Advances in Numerical Methods for Fluid Flow with Applications
 The 40th SIAM Southeastern Atlantic Section Conference (SIAM-SEAS)
 University of Georgia, Athens, GA, March 13, 2016
- Fifth Annual Graduate Student Mini-conference in Computational Mathematics Clemson University, Clemson, SC, Feb 9, 2013

Conference and Workshop Participation

- The 5th Annual Meeting of SIAM Central States Section Iowa State University, Ames, IA, Oct 19 - Oct 20, 2019
- Conference on Structure Preserving Discretizations: FEMs, Splines, and IGA University of Pittsburgh, Pittsburgh, PA, May 31 - June 1, 2019
- Workshop on Nonlocal Models in Mathematics, Computation, Science, and Engineering Oak Ridge National Laboratory, Oak Ridge, TN, Oct 26 28, 2015

- Workshop on Turbulent Transport and Mixing Institute for Pure & Applied Mathematics, UCLA, Los Angeles, CA, Oct 13 - 17, 2014
- Workshop on Mathematical Analysis of Turbulence Institute for Pure & Applied Mathematics, UCLA, Los Angeles, CA, Sep 29 - Oct 3, 2014
- Workshop on Proven Algorithmic Techniques for Many-core Processors Pittsburgh Supercomputing Center, Pittsburgh, PA, Aug 13 - 17, 2012

Professional Memberships

Society for Industrial and Applied Mathematics (SIAM)

AWARDS AND HONORS

• NSF CAREER award, National Science Foundation	July 2022
• Andrew Mellon Predoctoral Fellowship, University of Pittsburgh	Fall 2014
\bullet Summer Fellowship, Department of Mathematics, University of Pittsburgh	July, Aug 2012
• National Inspirational Scholarship, Ministry of Education of China	Sep 2008, Sep 2009
• Xi'an Jiaotong University Excellent Student, Xi'an Jiaotong University	Sep 2008, Sep 2009
• Siyuan Scholarship, Xi'an Jiaotong University	Sep 2007
• Siyuan Freshman Scholarship, Xi'an Jiaotong University	Mar 2007

TEACHING EXPERIENCE

Assistant Professor, Department of Mathematics, University of Florida	Fall 2020 - present
• MAD 4401: Introduction to Numerical Analysis (Undergraduate)	Spring 2023
• MAP 7436: Introduction to Turbulence Modeling (Graduate)	Fall 2022
• MAD 6407: Numerical Analysis (Graduate)	Spring 2022
• MAP 2302: Elementary Differential Equations (Undergraduate)	Spring 2022
• MAT 6932: Introduction to Numerical Analysis in Computational Fluid Dynamics	s (Graduate) Fall 2021
• MAP 2302: Elementary Differential Equations (Undergraduate)	Spring 2021
• MAD 4401: Introduction to Numerical Analysis (Undergraduate)	Fall 2020
$\textbf{Assistant Professor},\ Department\ of\ Mathematics\ and\ Statistics,\ Missouri\ S\&T$	Fall 2016 - Spring 2020
• MATH 3304: Elementary Differential Equations - Section 107 (Undergraduate)	Spring 2020
• MATH 3304: Elementary Differential Equations - Section 108 (Undergraduate)	Spring 2020
• MATH 6001: Numerical Analysis in Computational Fluid Dynamics (Graduate)	Fall 2019
• MATH 3304: Elementary Differential Equations - Section 108 (Undergraduate)	Fall 2019
• MATH 5325: Partial Differential Equations (Undergraduate/Graduate)	Spring 2019
• MATH 3304: Elementary Differential Equations - Section F (Undergraduate)	Fall 2018
• MATH 5325: Partial Differential Equations (Undergraduate/Graduate)	Fall 2018
• MATH 3304: Elementary Differential Equations - Section B (Undergraduate)	Spring 2018
• MATH 3304: Elementary Differential Equations - Section H (Undergraduate)	Fall 2017
• MATH 5325: Partial Differential Equations (Undergraduate/Graduate)	Fall 2017
\bullet MATH 3304: Elementary Differential Equations - Section L (Undergraduate)	Spring 2017
• MATH 3304: Elementary Differential Equations - Section C (Undergraduate)	Fall 2016
\bullet MATH 3304: Elementary Differential Equations - Section N (Undergraduate)	Fall 2016

- MATH 0420: Introduction to One-Variable Calculus
- MATH 0240: Analytic Geometry and Calculus III
- MATH 0230: Analytic Geometry and Calculus II
- MATH 0220: Analytic Geometry and Calculus I
- MATH 0120: Business Calculus

FACULTY SERVICE

• Thesis Advisor to Graduate Students

- Ying Li, Ph.D., Mathematics, University of Florida, expected in 2023.
 - → Dissertation: Efficient Ensemble Methods for Simulating Groundwater-Surface Water Flows
 - → First Position: Ying has accepted a Postdoc position from Ohio State University starting in Fall 2023
 - → Papers finished/in progress under my supervision during her PhD
 - (1) N. Jiang, Y. Li and H. Yang. An Artificial Compressibility Crank-Nicolson Leap-Frog Method for the Stokes-Darcy Model and Application in Ensemble Simulations, SIAM Journal on Numerical Analysis, 59 (2021), 401-428.
 - (2) N. Jiang, Y. Li and H. Yang. A Second Order Ensemble Method with Different Subdomain Time Steps for Simulating Coupled Surface-Groundwater Flows, Numerical Methods for Partial Differential Equations, 38 (2022), 1880-1907.
 - (3) N. Jiang and Y. Li. SAV Decoupled Projection Ensemble Methods for Simulating Surface-Groundwater Flows, in preparation, 2022.
- John Carter, Ph.D., Mathematics, Missouri S&T, expected in 2023. (co-advised with Daozhi Han)
 - → Papers finished/in progress under my supervision during his PhD
 - (1) **J. Carter** and N. Jiang. Numerical Analysis of A Second Order Ensemble Method for Evolutionary MHD Equations at Small Magnetic Reynolds Number, Numerical Methods for Partial Differential Equations, 38 (2022), 1407-1436.
 - (2) **J. Carter**, D. Han and N. Jiang. Second Order, Unconditionally Stable, Linear Ensemble Algorithms for the Magnetohydrodynamics Equations, submitted to Journal of Scientific Computing, in review, 2022.
 - (3) **J. Carter**, D. Han and N. Jiang. A Second Order, Linear, Unconditionally Stable, Crank-Nicolson-Leapfrog Scheme for the Magnetohydrodynamics Equations, in preparation, 2022.
- Changxin Qiu, Ph.D., Mathematics, Missouri S&T, 2019. (co-advised with Xiaoming He)
 - → Dissertation: Decoupling Methods for the Time-Dependent Navier-Stokes-Darcy Interface Model
 - → First Position: Postdoc, Iowa State University, Iowa, USA, 2019 2021
 - → Current Position: Associate Professor, Ningbo University, Zhejiang, China, 2021 present
 - → Papers finished under my supervision during his PhD
 - (1) N. Jiang and C. Qiu. An Efficient Ensemble Algorithm for Numerical Approximation of Stochastic Stokes-Darcy Equations, Computer Methods in Applied Mechanics and Engineering, 343 (2019), 249-275.

- (2) X. He, N. Jiang and C. Qiu. An Artificial Compressibility Ensemble Algorithm for a Stochastic Stokes-Darcy Model with Random Hydraulic Conductivity and Interface Conditions, International Journal for Numerical Methods in Engineering, 121 (2020), 712-739.
- (3) N. Jiang and C. Qiu. Numerical Analysis of A Second Order Ensemble Algorithm for Numerical Approximation of Stochastic Stokes-Darcy Equations, Journal of Computational and Applied Mathematics, 406 (2022), 113934.

• Ph.D. Dissertation Committee Member

- Michelle Baker, Ph.D., Mathematics, University of Florida. (advisor: Sara Pollock)
- Rhea Shroff, Ph.D., Mathematics, University of Florida. (advisor: Sara Pollock)
- Shuxian Xu, Ph.D., Mathematics, University of Pittsburgh. (advisor: William Layton)
 - * Overview Exam: October 20, 2022
- Matthew Dallas, Ph.D., Mathematics, University of Florida. (advisor: Sara Pollock)
 - * Oral Exam: August 18, 2022
- Nirjal Shrestha, Ph.D., Mathematics, University of Florida. (advisor: William Hager)
 - * Oral Exam: May 9, 2022
- Boya Yang, Ph.D., Mathematics, University of Florida. (advisor: Libin Rong)
 - → Oral Exam: September 23, 2021
 - → Final Defense: January 31, 2023
 - → Dissertation: Mathematical Modeling in Thyroid Disorders and Diabetes
- Jianhui Cheng, Ph.D., Mechanical & Aerospace Engineering, University of Florida, 2022. (advisor: Steven Miller)
 - → Candidacy Exam: February 15, 2021
 - → Final Defense: July 11, 2022
 - → Dissertation: The Application of Instability Wave Theory on Acoustic Radiation within Off-Design Supersonic Jets and on Two-Point Statistics within High-Speed Flow over Sharp and Blunt Cones with Plasma Actuation
- Madhuka Weerasinghe, Ph.D., Mathematics, Missouri S&T, 2017. (advisor: John Singler)
 - → Final Defense: June 30, 2017
 - → Dissertation: Balanced Truncation Model Reduction of Nonlinear Cable-Mass PDE System

• Examiner for Ph.D. Qualifying exam

- MATH 5325 Partial Differential Equations, Missouri S&T (Jan 2018, Jan 2019, Sep 2019, Jan 2020)
- MATH 6601 Numerical Analysis, Missouri S&T (Jan 2019)
- Computational Project, Missouri S&T (Sep 2019)

• Campus committee member

- Rules and Regulations Revision Committee for Graduate Faculty, Missouri S&T (2019 - 2020)

• Department committee member

University of Florida:

- Faculty Search Committee (2022 2023)
- Graduate Selection Committee (2022 2023)
- Colloquium, Conferences, Visitors, and Travel Committee (2020 present)
- Computer and Technology Committee (2021 present)
- Numerical Analysis PhD Examination Committee (2020 present)
- Center for Applied Mathematics (CAM) Summer Graduate Research Fellowship Selection Committee (March 2022)

Missouri S&T:

- Colloquium Organizing Committee (2019 2020)
- Department Website Committee (2019 2020)
- Textbook Reviewing Committee for Math 3304 Elementary Differential Equations (2018)

• Course Coordinator

– MATH 3304 Elementary Differential Equations, Missouri S&T (Spring 2020, 11 sections, about 440 students)

• Seminar Organizer

 Applied and Numerical Analysis Seminar, University of Florida, 2020 - present (currently co-organized with Chunmei Wang)

PROFESSIONAL SERVICE

• Grant Reviewer

- National Science Foundation (NSF)

• Journal Referee

- Advances in Applied Mathematics and Mechanics
- Advances in Computational Mathematics
- Applied Mathematics and Computation
- Applied Numerical Mathematics
- Computational Methods in Applied Mathematics
- Computer Methods in Applied Mechanics and Engineering
- Computer Physics Communications
- Computers and Mathematics with Applications
- Discrete and Continuous Dynamical Systems Series B
- Discrete and Continuous Dynamical Systems Series S

- Dynamics of Atmospheres and Oceans
- Electronic Research Archive
- Fluids
- International Journal of Numerical Analysis and Modeling
- International Journal of Numerical Methods for Heat and Fluid Flow
- Journal of Computational and Applied Mathematics
- Journal of Engineering Mathematics
- Journal of Mathematical Analysis and Applications
- Journal of Scientific Computing
- Numerical Algorithms
- Numerical Mathematics: Theory, Methods and Applications
- Numerical Methods for Partial Differential Equations
- Results in Applied Mathematics
- SIAM Journal on Applied Mathematics
- SIAM Journal on Numerical Analysis

• Journal Guest Editor

Electronic Research Archive, 2020-2021
 special issue on Recent Advances in Numerical Analysis, 2021.

• Conference Organization

Midwest Numerical Analysis Day
 Missouri University of Science and Technology, Rolla, MO, Oct 29-30, 2021.

$\bullet \ \ Minisymposium \ \ Organization$

Minisymposium on Monte Carlo and Ensemble Methods for Uncertainty Quantification
 SIAM Conference on Computational Science and Engineering (SIAM-CSE)
 Hilton Atlanta, Atlanta, GA, Feb 27 - March 3, 2017.
 (co-organized with Lindley Graham)