Mengying Xiao

Contact Information

LIT 321 Department of Mathematics University of Florida Gainesville, FL 32611

Email: m.xiao@ufl.edu https://people.clas.ufl.edu/m-xiao/

Position

Visiting Assistant Professor Department of Mathematics, University of Florida

Visiting Assistant Professor Department of Mathematics, College of William & Mary Aug. 2019 - present Gainesville, FL

Aug. 2018 - May 2019 Williamsburg, VA

Education

Ph.D. in Mathematics at Clemson University, Aug. 2018 Advisor: Prof. Leo Rebholz & Prof. Timo Heister

M.S. in Mathematics at Capital Normal University (China), June 2013 Advisor: Prof. Jiabao Su

B.S. in Mathematics at Capital Normal University (China), June 2010

Research Interest

My research lies in numerical analysis and partial differential equations (PDEs), especially in developing efficient and accurate numerical methods to solve PDEs (primarily Navier-Stokes). I am also interested in solving other types of PDEs modeling physical processes (for instance, MHD, Cahn-Hillar Navier-Stokes, etc.), and open to other process/phenomena with modern applications.

Publications

Published

- L. Rebholz and M. Xiao, On reducing the splitting error in Yosida methods for the Navier-Stokes equations with grad-div stabilization, *Computer Methods in Applied Mechanics and Engineering*, 294, 259-277, 2015.
- T. Heister, L. Rebholz and M. Xiao, Flux-preserving enforcement of inhomogeneous Dirichlet boundary conditions for strongly divergence-free mixed finite element methods for flow problems, *Journal of Mathematical Analysis and Applications*, 438(1), 507-513, 2016.
- M. Akbas, M. Mohebujjaman, L. Rebholz, M. Xiao, High order algebraic splitting for magnetohydrodynamics simulation, *Journal of Computational and Applied Mathematics*, 321:128-142, 2017.
- 4. L. Rebholz and M. Xiao, Improved accuracy in algebraic splitting methods for Navier-Stokes equations, SIAM Journal on Scientific Computing, 39(4), A1489-A1513, 2017.
- L. Rebholz, S. Wise and M. Xiao, Penalty-Projection Schemes for the Cahn-Hilliard Navier-Stokes Diffuse Interface Model of Two Phase Flow, and their Connection to Divergence-Free Coupled Schemes, *International Journal on Numerical Analysis and Modeling*, 4, 649-676, 2018.
- A. Viguerie and M. Xiao, Effective Chorin-Temam Algebraic Splitting Schemes for the Steady Navier-Stokes Equations, Numerical Methods for Partial Differential Equations, 35(2), 805-829, 2018.

- L. Rebholz, A.Viguerie and M. Xiao, Efficient nonlinear iteration schemes based on algebraic splitting for the incompressible Navier-Stokes equations, *Mathematics of Computation*, 88, 1533-1557, 2019.
- S. Pollock, L. Rebholz and M. Xiao, Anderson-accelerated convergence of Picard iterations for incompressible Navier-Stokes equations, SIAM Journal on Numerical Analysis, 57(2), 615-637, 2019.
- 9. L. Rebholz, A.Viguerie and M. Xiao, Analysis of Algebraic Chorin Temam splitting for incompressible Navier-Stokes equations and comparison to Yosida methods, *Journal of Computational* and Applied Mathematics, 365, 112366, 2020.

In Progress

- 1. M. Xiao, An efficient nonlinear solver for steady MHD based on algebraic splitting, submitted.
- 2. C. Evans, S. Pollock, L. Rebholz and M. Xiao, A proof that Anderson acceleration increases the convergence rate in linearly converging fixed point methods (but not in quadratically converging ones), *SIAM Journal on Numerical Analysis*, under minor revision, 2019.

Teaching Experience

Department of Mathematical Sciences, Clemson University, Clemson, SC		
- Math 1020, Introduction to Mathematical Analysis	FA2014	
- Math 2070, Multivariable Calculus	SP2015, FA2015	
- Math 1080, Calculus of One Variable II	SP2017, FA2017	
- Math 3650, Numerical Methods for Engineers	SP2018	
Department of Mathematics, College of William & Mary, Williamsburg, VA		
- Math 111, Calculus I	FA2018	
- Math 106, Elementary Probability and Statistics	SP2019	
- Math 302, Ordinary Differential Equations	FA2018, SP2019	
Department of Mathematics, University of Florida, Gainesville, FL		
- MAP4305/MAP5304, DIFF EQUA EG & PHY SCI/INTERMED DIFF EQUA	UATNS FA2019	

Awards

Outstanding Graduate in Discovery, College of Science, Clemson University	2018
Outstanding Graduate Research Award, Dept. of Mathematical Sciences, Clemson University 2018	2017 &
Outstanding Teaching Assistant Award, Dept. of Mathematical Sciences, Clemson University	2015
Michael Case Award (A travel award from Michael Case's family)	2014
Scholarship for Excellent First Year, Capital Normal University	2011
Outstanding Undergraduate, Capital Normal University	2010
Second Level Coach Title of Chinese Mathematical Olympiad, China	2009

Conference Talks

- "Efficient methods for solving steady Navier-Stokes equations" Computational Math Seminar University of Pittsburgh, Pittsburgh, April 2019
- "Analysis of Algebraic Chorin Temam splitting for incompressible Navier-Stokes equations" Joint Mathematical Meeting Baltimore, Jan. 2019
- "Algebraic Splitting Methods for Solving Saddle Point Problems Arising in Computational Fluid Dynamics"
 Math Colloquim
 College of William & Mary, Dec. 2018

• "Analysis of Algebraic Chorin Temam splitting for incompressible Navier-Stokes equations"		
Finite Element Circus	University of Delaware, Nov. 2018	
• "Algebraic Splitting Methods for Solving Saddle Point Pa Dynamics"	roblems Arising in Computational Fluid	
Computational Math Seminar	Clemson University, Feb. 2018	
• "Efficient nonlinear iteration schemes based on algebra Stokes equations"	aic splitting for incompressible Navier-	
9th Annual Graduate Student Mini-conference	University of South Carolina, Feb. 2018	
• "Efficient nonlinear iteration schemes based on algebraic splitting for incompressible Navier- Stokes equations"		
Joint Mathematical Meeting	San Diego, Jan. 2018	
• "Some improvements to Yosida methods for Navier-Stokes simulations"		
7th Mini-conference for graduate students	Clemson University, Feb. 2016	
• "On reducing the splitting error in Yosida methods for stabilization"	· Navier-Stokes equations with grad-div	
Finite Element Circus	UMass Dartmouth, Oct. 2015	
• "On reducing the splitting error in Yosida methods for stabilization"	Navier-Stokes equations with grad-div	
AMS Western Section Univ	ersity of Nevada, Las Vegas, April 2015	
• "On reducing the splitting error in Yosida methods for stabilization"	· Navier-Stokes equations with grad-div	

Computational Math Seminar

Clemson University, April 2015

Professional Membership

American Mathematical Society (AMS), Women in Numerical Analysis and Scientific Computing (WINASC)

Programming Experience

I am fluent with MATLAB, Python and FreeFEM, medium-level experience with C, C++.