

CURRICULUM VITAE

XIANGCHENG ZHENG

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Education

Ph.D. Candidate Mathematics, University of South Carolina Fall 2016 - present
B.S. Petroleum Engineering, China University of Petroleum Summer 2016

Honors and Awards

- George W. Johnson Graduate Fellowship in Applied Mathematics, Spring 2019
Department of Mathematics, University of South Carolina
- Outstanding First Year ACM Graduate Student, Spring 2017
Department of Mathematics, University of South Carolina
- Outstanding Graduate in Shandong Province, Spring 2016
School of Petroleum Engineering, China University of Petroleum
- National Scholarship, Fall 2013 and Fall 2014
College of Science, China University of Petroleum

Funding and Grants

- SPARC Graduate Research Grant (\$5000), 2020-2021
The Office of the Vice President for Research, University of South Carolina
- Department Travel Grants ($\$500 \times 3$), 2019
Department of Mathematics, University of South Carolina

Professional services

- Reviewers for International Journal of Computer Mathematics, Mathematical Methods in the Applied Sciences, Numerical Methods for Partial Differential Equations.

Publications

In print

(2020)

1. H. Wang and X. Zheng, An optimal-order error estimate of the lowest-order ELLAM-MFEM approximation to miscible displacement in three space dimensions. *J. Comput. Appl. Math.* (2020) <https://doi.org/10.1016/j.cam.2020.112819>.
2. X. Zheng, V. J. Ervin, H. Wang, Wellposedness of the two-sided variable-coefficient Caputo flux fractional diffusion equation and error estimate of its spectral approximation. *Appl. Numer. Math.* **153** (2020) 234–247.
3. X. Zheng and H. Wang, Wellposedness and regularity of a variable-order space-time fractional diffusion equation. *Anal. Appl.* (2020) <https://doi.org/10.1142/S0219530520500013>.

4. X. Zheng and H. Wang, An optimal-order numerical approximation to variable-order space-fractional diffusion equations on uniform or graded meshes. *SIAM J. Numer. Anal.* **58** (2020) 330–352.
5. X. Zheng and H. Wang, Wellposedness and smoothing properties of history-state-based variable-order time-fractional diffusion equations. *Z. Angew. Math. Phys.* **71** (2020) 34.
6. X. Zheng, V. J. Ervin, H. Wang, An indirect finite element method for variable-coefficient space-fractional diffusion equations and its optimal order error estimates. *Commun. Appl. Math. Comput.* **2** (2020) 147–162.
7. J. Jia, X. Zheng, H. Fu, P. Dai and H. Wang, A fast method for variable-order space-fractional diffusion equations. *Numer. Algor.* (2020) <https://doi.org/10.1007/s11075-020-00875-z>.
8. P. Dai, Q. Wu, H. Wang, X. Zheng, An efficient matrix splitting preconditioning technique for two-dimensional unsteady space-fractional diffusion equations. *J. Comput. Appl. Math.* **371** (2020) 112673.
9. C. Chen, H. Liu, X. Zheng, H. Wang, A two-grid MMOC finite element method for nonlinear variable-order time-fractional mobile/immobile advection-diffusion equations. *Comp. Math. Appl.* (2020) <https://doi.org/10.1016/j.camwa.2019.12.008>.

(2019)

10. X. Zheng and H. Wang, Wellposedness and regularity of a nonlinear variable-order fractional wave equation. *Appl. Math. Lett.* **95** (2019) 29–35.
11. X. Zheng, J. Cheng and H. Wang, Uniqueness of determining the variable fractional order in variable-order time-fractional diffusion equations. *Inverse Problems* **35** (2019) 125002.
12. X. Zheng, V. J. Ervin, H. Wang, Spectral approximation of a variable coefficient fractional diffusion equation in one space dimension. *Appl. Math. Comput.* **361** (2019) 98–111.
13. X. Zheng, H. Liu, H. Wang, H. Fu, An efficient finite volume method for the nonlinear distributed-order space-fractional diffusion equations in three space dimensions. *J. Sci. Comput.* **80** (2019) 1395–1418.
14. X. Zheng, V. J. Ervin, H. Wang, Numerical approximations for the variable coefficient fractional diffusion equations with non-smooth data. *Comp. Meth. Appl. Math.* (2019) <https://doi.org/10.1515/cmam-2019-0038>.
15. H. Wang and X. Zheng, Wellposedness and regularity of the variable-order time-fractional diffusion equations. *J. Math. Anal. Appl.* **475** (2019) 1778–1802.
16. H. Wang and X. Zheng, A modified time-fractional diffusion equation and its finite difference method: regularity and error analysis. *Fract. Calc. Appl. Anal.* **22** (2019) 1014–1038.
17. H. Wang and X. Zheng, Analysis and numerical solution of a nonlinear variable-order fractional differential equation. *Adv. Comput. Math.* **45** (2019) 2647–2675.
18. H. Fu, Y. Sun, H. Wang, X. Zheng, Stability and convergence of a Crank–Nicolson finite volume method for space fractional diffusion equations. *Appl. Numer. Math.* **139** (2019) 38–51.
19. H. Fu, H. Liu, X. Zheng, A preconditioned fast finite volume method for the distributed-order diffusion equation and its application in parameter identification. *East. Asia. J. Appl. Math.* **9** (2019) 28–44.

In revision

20. X. Zheng and H. Wang, Finite element approximations to variable-order time-fractional diffusion equations and their analysis without regularity assumptions of the solutions. *IMA J. Numer. Anal.* in revision.

21. X. Zheng and H. Wang, Variable-order space-fractional diffusion equations and a variable-order modification of constant-order fractional problems. *Appl. Anal.* in revision.
22. P. Dai, J. Jia, H. Wang, Q. Wu, X. Zheng, An efficient positive-definite block-preconditioned finite volume solver for two-sided fractional diffusion equations on composite mesh. *Numer. Linear Algebra Appl.* in revision.

Submitted

23. X. Zheng and H. Wang, An optimal-order error estimate for a spectral Galerkin approximation to a mobile-immobile variable-order space-time fractional diffusion equation with a hidden memory. Submitted.
24. X. Zheng, J. Cheng and H. Wang, Uniqueness of determining the variable fractional order in the boundary-value problem of variable-order linear space-fractional diffusion equations with variable diffusivity coefficients. Submitted.
25. X. Zheng, V. J. Ervin, H. Wang, Optimal Petrov-Galerkin spectral approximation method for the fractional diffusion, advection, reaction equation on a bounded interval. Submitted.
26. X. Zheng, Z. Zhang, H. Wang, Analysis of a nonlinear variable-order fractional stochastic differential equation. Submitted.
27. X. Zheng, H. Liu, H. Wang, H. Fu, Optimal-order finite element approximations to variable-coefficient two-sided space-fractional advection-reaction-diffusion equation in three space dimensions. Submitted.
28. Z. Yang, X. Zheng, H. Wang, A variably distributed-order time-fractional diffusion equation: analysis and approximation. Submitted.
29. H. Liu, X. Zheng, C. Chen, H. Wang, A characteristic finite element method for the time-fractional mobile/immobile advection diffusion model. Submitted.
30. H. Liu, X. Zheng, H. Fu, H. Wang, Analysis and efficient implementation of ADI finite volume method for Riesz space-fractional diffusion equations in two space dimensions. Submitted.
31. J. Jia, H. Wang and X. Zheng, A preconditioned fast finite element approximation for variable-order time-fractional diffusion equations in multiple space dimensions. Submitted.
32. H. Wang, Y. Li, J. Cheng, X. Zheng, Inverting the time-dependent variable order in a two-dimensional variable-order time-fractional diffusion equation: analysis and simulation. Submitted.

Conference presentations

Plenary talks

1. “ Spectral approximation of a variable coefficient fractional diffusion equation in one space dimension ” on *International Workshop on Theory and Applications of FPDEs*, Qingdao, China, June 30–July 01, 2018.
2. “ Wellposedness and regularity of variable-order time-fractional diffusion equations ” on *3rd Workshop on Numerical Methods for Fractional-Derivative Problems*, Beijing, China, April 26–27, 2019.

Invited minisymposium talks

3. “ On mathematical and numerical analysis for the variable-order fractional differential equations ” on *SIAM CSE*, Spokane, WA, February 24–March 01, 2019.
4. “ On the mathematical analysis of the variable-order time-fractional diffusion equations and applications to the numerical approximations and inverse problems ” on *Annual Conference on Computational Mathematics*, Harbin, China, July 31–August 04, 2019.

5. “ Analysis and numerical simulations of variable-order time-fractional diffusion equations ” on *SIAM SEAS*, Knoxville, TN, September 20–22, 2019.

Colloquium talks

1. “ A spectral method for the boundary value problem of fractional diffusion equation ” on Graduate Colloquium, Department of Mathematics, University of South Carolina, October 23, 2018.
2. “ Mathematical and numerical analysis for the space-fractional diffusion equation ”, College of Science, China University of Petroleum, December 20, 2018.
3. “ Fractional Calculus and its applications in nonlocal modeling ”, School of Petroleum Engineering, China University of Petroleum, December 22, 2018.
4. “ Wellposedness and regularity of variable-order time-fractional diffusion equations ”, School of Mathematical Sciences, Fudan University, May 06, 2019.
5. “ Wellposedness and regularity of variable-order time-fractional diffusion equations ”, School of Mathematical Sciences, East China Normal University, May 10, 2019.
6. “ Wellposedness and regularity of variable-order time-fractional diffusion equations ”, College of Science, Shanghai University, May 14, 2019.
7. “ Wellposedness and regularity of variable-order time-fractional diffusion equations ”, College of Science, Southeast University, May 17, 2019.
8. “ An efficient finite volume method for nonlinear distributed-order space-fractional diffusion equations ”, School of Mathematics and Information Sciences, Yantai University, May 24, 2019.
9. “ Finite element approximations to variable-order fractional differential equations without regularity assumptions of the true solutions ”, Huicui College, China University of Petroleum, December 25, 2019.
10. “ Numerical approximation to a space-fractional diffusion equation with non-smooth data ”, School of Mathematics and Statistics, Shandong Normal University, December 27, 2019.
11. “ Mathematical and numerical analysis to variable-order mobile-immobile time-fractional diffusion equations ” on Applied and Computational Mathematics seminar, Department of Mathematics, University of South Carolina, January 31, 2020.