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Joshua Lee Padgett

Curriculum Vitae

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Academic Appointments

2017–Present	**Postdoctoral Research Associate**, *Texas Tech University*, Department of Mathematics and Statistics.
2017	**Teacher of Record**, *Baylor University*, Department of Computer Science.
2013–2017	**Teacher of Record**, *Baylor University*, Department of Mathematics.

Research Interests

Applied mathematics, numerical analysis, computational mathematics, geometric and Lie group integration methods, operator splitting methods, quenching-combustion differential equations, predator-prey models, nonlinear differential equations, fractional differential equations, stochastic differential equation

Education

2012–2017	**Doctor of Philosophy**, *Baylor University*, Mathematics.
	Dissertation Title: *Solving Stochastic and Degenerate Kawarada Partial Differential Equations via Adaptive Splitting Methods*
	Advisor: Qin Sheng
2008–2012	**Bachelor of Science**, *Gardner-Webb University*, Mathematics, *summa cum laude.*
	Thesis Title: *Could Metabolism Hold the Key to New Cancer Treatment Options?*
	Advisor: Cathleen Cielsielski

Grants and Awards

1. **Onset of Turbulence in Dusty Plasma Liquids**; *NSF/DOE Partnership in Basic Plasma Science and Engineering*; E. Kostadinova, J. L. Padgett, C. Liaw, L. Matthews, T. Hyde; **Amount: $257,840**; (NSF-1903450)

Publications

1. J. L. Padgett, E. G. Kostadinova, C. D. Liaw, K. Busse, L. S. Matthews, and T. W. Hyde, Anomalous diffusion in one-dimensional disordered systems: A discrete fractional Laplacian method (Part I), (submitted).

2. J. L. Padgett, Analysis of an approximation to a fractional extension problem, (accepted).

3. J. L. Padgett and Q. Sheng, Convergence of an operator splitting scheme for abstract stochastic evolution equations, *Advances in Math. Methods and High Performance Computing*, Editor-in-Chief: Vinai K. Singh, Springer-Verlag, Switzerland, 2019, 163–179.

4. M. A. Bearegard and J. L. Padgett, A variable nonlinear splitting algorithm for reaction diffusion systems with self and cross-diffusion, *Num. Meth. Part. Diff. Eq.*, **35** (2019), 597-614.

5. J. L. Padgett, The quenching of solutions to time-space fractional Kawarada problems, *Comp. Math. Appl.*, **76** (2018), 1583-1592.

6. J. L. Padgett and Q. Sheng, Numerical solution of degenerate stochastic Kawarada equations via a semi-discretized approach, *Appl. Math. Comp.*, **325** (2018), 210-226.

Work in Progress

1. E. Servin and J. L. Padgett, Approximating Kawarada equations on a disk via nonlinear splitting methods, (in preparation).

2. Y. J. Nam and J. L. Padgett, Numerical simulations for an improved stochastic Alzheimer's model , (in preparation).

3. J. L. Padgett, E. G. Kostadinova, C. D. Liaw, K. Busse, L. S. Matthews, and T. W. Hyde, Anomalous diffusion in one-dimensional disordered systems: A discrete fractional Laplacian method (Part II), (in progress).

4. J. L. Padgett and J. Miller, The Hopf algebraic structure of splitting methods for Lévy-driven stochastic differential equations, (in preparation).

5. J. L. Padgett, Symmetry-based adaptive numerical methods for reaction-diffusion systems with self-diffusion, (in preparation).

6. J. L. Padgett, Weak convergence of the abstract Lie-Trotter stochastic operator splitting, (in preparation).

Presentations

1. *Structure-preserving operator splitting methods for nonlinear differential equations driven by rough paths*; Joint Mathematics Meetings; Denver, Colorado (January 2020).

2. *A semi-analytical approach to approximating non-local equations arising in porous media*; SIAM Northern States Section; Laramie, Wyoming (September 2019).

3. *Semi-analytic methods for the approximation of abstract fractional extension problems*; Applied Mathematics Seminar; Department of Mathematics and Statistics, Texas Tech University; Lubbock, Texas (March 2019).

4. *Anderson localization in nonlocal models*; Analysis Seminar; Department of Mathematics and Statistics, Texas Tech University; Lubbock, Texas (February 2019).

5. *Operator splitting methods for approximating singular nonlinear differential equations* ; Numerical Analysis Seminar; Department of Mathematical Sciences, University of Delaware; Newark, Delaware (November 2018).

6. *Operator splitting methods for solving stochastic differential equations*; Department Colloquium; Department of Mathematics, Baylor University; Waco, Texas (November 2018).

7. *Hopf Algebras and Numerical Integrators*; Geometry Seminar; Department of Mathematics and Statistics, Texas Tech University; Lubbock, Texas (October 2018).

8. *Analysis of an approximation of a fractional extension problem*; SIAM Annual Meeting, Special Session; Eugene, Oregon (June 2018).

9. *Lie-Butcher series from an algebraic geometry point of view*; Geometry Seminar; Department of Mathematics and Statistics, Texas Tech University; Lubbock, Texas (April 2018).

10. *Approximating the fractional Laplace equation via operator theoretical methods*; West Texas Applied Math Symposium, Texas Tech University; Lubbock, Texas (April 2018).

11. *An introduction to geometric numerical integration*; Geometry Seminar; Department of Mathematics and Statistics, Texas Tech University; Lubbock, Texas (March 2018).

12. *Operator splitting methods for approximating differential equations*; Junior Scholar Symposium; Department of Mathematics and Statistics, Texas Tech University; Lubbock, Texas (February 2018).

13. *An operator theoretical approach to nonlocal differential equations*; Analysis Seminar; Department of Mathematics and Statistics, Texas Tech University; Lubbock, Texas (November 2017).

14. *Operator Splitting and Lie Group Methods for Geometric Integration*; Seminar in Applied Mathematics; Department of Mathematics and Statistics, Texas Tech University; Lubbock, Texas (November 2017).

15. *An exploration of quenching-combustion via globalized fractional models*; SIAM Annual Meeting, Special Session; Pittsburgh, Pennsylvania (July 2017).

16. *Solving degenerate stochastic Kawarada equations via adaptive operator splitting methods*; University of Central Arkansas, Graduate Mathematics Seminar; Conway, Arkansas (January 2017).

17. *An approach to the numerical solution of multidimensional stochastic Kawarada equations via adaptive operator splitting*; Joint Mathematics Meeting; Atlanta, Georgia (January 2017).

18. *Using Matlab to Solve Nonlinear PDE*; AMS Student Meeting; Baylor University; Waco, Texas (October 2016).

19. *Using an adaptive Crank-Nicolson scheme to solve the degenerate stochastic Kawarada equation on nonuniform grids*; SIAM Central States Section Meeting, Special Session; Little Rock, Arkansas (September 2016).

20. *Positive and Monotone Solutions to Quenching Differential Equations*; Differential Equations Seminar; Baylor University; Waco, Texas (April 2016, 6 lectures).

21. *A semi-adaptive LOD method for solving three-dimensional degenerate Kawarada equations*; AMS Spring Southeastern Sectional Meeting; Athens, Georgia (March 2016).

22. *A novel LOD method for solving degenerate Kawarada equations*; CASPER seminar; Waco, Texas (February 2016).

23. *Numerical Solutions to Singular Differential Equations*; AMS Student Meeting; Baylor University; Waco, Texas (October 2015).

24. *An Exploration of the Exponential Splitting*; Joint Mathematics Meeting, Special Session; San Antonio, Texas (January 2015).

Conference Organization

1. Highly accurate and structure-preserving numerical methods for nonlinear partial differential equations; Joint Mathematics Meeting Special Session 2020; organized by Q. Sheng, J. L. Padgett, and J. Macias-Diaz (accepted)

2. M3HPCST-2020 Research Conference Proposal, Indo-U.S. Science & Technology Forum (IUSSTF), India, 2019-2021; V. J. Singh, Q. Sheng, J. L. Padgett (accepted).

Students Advised

1. Yu Jung Nam (doctoral student)

2. Yusup Geldiyev (doctoral student)

3. Eduardo Servin (undergraduate student)

Travel Grants

1. **Graduate School Travel Award**; Baylor University; *An exploration of quenching-combustion via globalized fractional models*; Summer 2017.

2. **Student Travel Award**; SIAM; *An exploration of quenching-combustion via globalized fractional models*; Summer 2017.

3. **Graduate School Travel Award**; Baylor University; *An approach to the numerical solution of multidimensional stochastic Kawarada equations via adaptive operator splitting*; Fall 2016.

4. **Graduate School Travel Award**; Baylor University; *Using an adaptive Crank-Nicolson scheme to solve the degenerate stochastic Kawarada equation on nonuniform grids*; Fall 2016.

5. **Graduate School Travel Award**; Baylor University; *A semi-adaptive LOD method for solving three-dimensional degenerate Kawarada equations*; Spring 2016.

Courses Taught

Fall 2019	**Abstract Algebra Applied I**, *Texas Tech University*.
Fall 2019	**Numerical Methods for Singular and Nonlinear Differential Equations**, *Texas Tech University*.
Fall 2019	**Mathematical Computing**, *Texas Tech University*.
Summer 2019	**Mathematical Computing**, *Texas Tech University*.
Summer 2019	**Linear Algebra**, *Texas Tech University*.
Spring 2019	**Abstract Algebra Applied II**, *Texas Tech University*.
Fall 2018	**Abstract Algebra Applied I**, *Texas Tech University*.
Summer 2018	**Mathematical Computing**, *Texas Tech University*.
Summer 2018	**Foundations of Algebra I**, *Texas Tech University*.
Spring 2018	**Computational Techniques for Science and Mathematics**, *Texas Tech University*.
Fall 2017	**Calculus III with Applications**, *Texas Tech University*, (two sections).
Spring 2017	**Partial Differential Equations**, *Baylor University*.
Spring 2017	**Discrete Structures**, *Baylor University*.
Fall 2016	**Calculus III**, *Baylor University*.
Spring 2016	**Calculus II**, *Baylor University*.
Fall 2015	**Calculus I**, *Baylor University*.
Spring 2015	**Calculus I**, *Baylor University*.
Fall 2014	**Business Precalculus**, *Baylor University*.

| Spring 2014 | **Precalculus**, *Baylor University*. |
| Fall 2013 | **Precalculus**, *Baylor University*. |

Honors and Awards

Fall 2015	**Outstanding Graduate School Teacher**, *Baylor University*.
2014–2015	**Department of Mathematics Outstanding Teaching Award**, *Baylor University*.
2012–2017	**Graduate School Fellowship**, *Baylor University*.
2011–2012	**Christenberry Award**, *Big South Conference (NCAA Division I)*.
2010–2012	**Track and Field Scholarship**, *Gardner-Webb University*.
2010–2011	**Undergraduate Research Award**, *Gardner-Webb University*.
2008-2009	**Outstanding Mathematics Award**, *Gardner-Webb University*.
2008–2012	**Presidential Fellow**, *Gardner-Webb University*.
2008-2011	**Robert C. Byrd Award**, *North Carolina Department of Education*.

Professional Travel

| July 2019 | **Isaac Newton Institute**, *Cambridge University*, *Geometry, Compatibility, and Structure-Preserving Workshop.* |
| July 2015 | **Mathematical Sciences Research Institute**, *University of California at Berkeley*, *Incompressible Fluid Flows at High Reynolds Number.* |

Service

2020	**Co-Organizer**, *Special Session*, Joint Mathematics Meeting, Denver, Colorado.
2019-2021	**Advisory Committee member**, *M3HPCST*.
2016–Present	**Reviewer**, *Numerical Methods in Partial Differential Equations*.
2017–Present	**Reviewer**, *Computers and Mathematics with Applications*.
2018–Present	**Reviewer**, *Computational and Mathematical Methods*.
2018–Present	**Reviewer**, *Journal of Computational Physics*.
2016-2017	**Vice President**, *Baylor AMS Chapter*, (co-founder).
November 2016	**Job Interview Panel**, *Organized and moderated the panel on job interviews for graduate students.*
September 2016	**Special Session Chair**, *SIAM Central States Section Meeting*.
September 2016	**Academic and Industry Job Panel**, *Organized and moderated panel on application materials regarding academic and industry jobs for graduate students.*
January 2015	**Special Session Chair**, *Joint Mathematics Meeting*.

Computer skills

| Language | Matlab, Mathematica, LaTeX, python, C++, parallel programming |
| Operating System | unix, Windows |