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RESEARCH INTERESTS

Applied Mathematics, Partial Differential Equations and Kinetic Theory, Multiscale Modeling and Simulation, Computational Virology and Bionanosystems, Nonlinear Wave Equations

EDUCATION

- 2005 Ph.D. Mathematical Sciences, Carnegie Mellon University (CMU)
(Advisor: Jack Schaeffer)
- 2001 M.S. Mathematical Sciences, Carnegie Mellon University
- 2000 B.S. Mathematical Sciences, Carnegie Mellon University
with Mellon College of Science & University Research Honors

EMPLOYMENT

- **Assistant Professor**, August 2010 - present
Department of Mathematics, United States Naval Academy (USNA)
- **Assistant Professor**, August 2008 - August 2010
Department of Mathematics, University of Texas at Arlington (UTA)
- **Postdoctoral Research Scientist**, August 2007 - August 2008
Center for Cell and Virus Theory, Indiana University
- **Zorn Postdoctoral Fellow**, August 2005 - June 2008
Department of Mathematics, Indiana University (IU)
- **Open Learning Initiative Program Fellow**, August 2004 - August 2005
The William and Flora Hewlett Foundation and Carnegie Mellon University:
Developed curriculum for, designed, and created an interactive, online Differential and Integral Calculus course.
- **Adjunct Faculty**, January 2004 - August 2004
The Pennsylvania State University, New Kensington and McKeesport Campuses
- **Peer Tutoring Coordinator**, August 2001 - August 2005
Office of Academic Development, Carnegie Mellon University:
Responsible for all activities within university-wide tutoring program, including hiring, scheduling, training, certification, and evaluation of tutors.
- **Graduate Researcher**, June 2000 - August 2000
Computational Sciences Research Institute (CSRI), Sandia National Laboratories
Advisors : Paul Boggs (Sandia), Anthony Kearsley (Carnegie Mellon/NIST)

LIST OF PUBLICATIONS

- [1] "Instability of steady states for damped nonlinear hyperbolic equations" (with P. Radu) *submitted to* Journal of Differential Equations.
- [2] "A One-dimensional Kinetic Model of Plasma Dynamics with a Hyperbolic Field " (with C. Nguyen and J. Anderson) *submitted to* SIAM Journal on Mathematical Analysis.
- [3] "A Multiscale Theory of Soft Matter" (with P. Ortoleva) *submitted to* Journal of Physical Chemistry B.
- [4] "Instability of some Periodic BGK Waves for the Vlasov-Poisson system" (with R. Allen) *submitted to* Involve.
- [5] "Nanosystem Self-Assembly Pathways Discovered via All-Atom Multiscale Analysis" *to appear* Journal of Physical Chemistry B (2012).
- [6] "A Particle Method for a Collisionless Plasma with Infinite Mass" *to appear* Mathematics and Computers in Simulation (2011).
- [7] "Computational Methods for a One-dimensional Plasma Model with Transport Field" (advisor/sponsor for D. Brewer) SIAM Journal on Undergraduate Research, Vol 4 (2011).
- [8] "Multiscaling for Systems with a Broad Continuum of Characteristic Lengths and Times: Structural Transitions in Nanocomposites" (with P. Ortoleva) Journal of Mathematical Physics **51**: 063303 (2010).
- [9] "Large Time Behavior of the Relativistic Vlasov-Maxwell System in Low Space Dimension" (with J. Schaeffer and R. Glassey) Differential and Integral Equations **23**: 61–77 (2010).
- [10] "Time Decay for Solutions to One-dimensional Equations of Plasma Dynamics" (with J. Schaeffer and R. Glassey) Quarterly of Applied Mathematics **68**: 135–141 (2010).
- [11] "Liquid-crystal Transitions: A First-principles Multiscale Approach" (with Z. Shreif and P. Ortoleva) Physical Review E **80**: 031703 (2009).
- [12] "On Long-time Behavior of Monocharged and Neutral Plasmas in One and one-half Dimensions" (with J. Schaeffer and R. Glassey) Kinetic & Related Models **2**: 465–488 (2009).
- [13] "Self-Assembly of Nanocomponents into Composite Structures: Derivation and Simulation of Langevin Equations" (with Y. Miao, Z. Shreif, and P. Ortoleva) Journal of Chemical Physics **130**: 194115 (2009).
*Also featured in Virtual Journal of Nanoscale Science and Technology **19** (2009).
- [14] "Multiscale Theory of Boson Droplets: Implications for Collective and Single-Particle Excitations" (with Z. Shreif, Y. Chen, and P. Ortoleva) Physical Review A **79**: 013628 (2009).
- [15] "Decay in Time for a One-Dimensional, Two Component Plasma" (with J. Schaeffer and R. Glassey) Mathematical Methods in the Applied Sciences **31**: 2115–2132 (2008).
- [16] "Stochastic Dynamics of Bionanosystems: Multiscale Analysis and Specialized Ensembles" (with J. Ortoleva, Y. Miao, Z. Shreif, and P. Ortoleva) Journal of Chemical Physics **128**: 234908 (2008).
*Also featured in Virtual Journal of Biological Physics Research **16** (2008) and Virtual Journal of Nanoscale Science and Technology **18** (2008).

- [17] “Multiscaling in Classical Nanosystems: Derivation of Smoluchowski and Fokker-Planck Equations” (with Z. Shreif and P. Ortoleva) *Physica A* **387**: 4053–4069 (2008).
- [18] “Explicit solutions of the One-Dimensional Vlasov-Poisson System with Infinite Mass” *Mathematical Methods in the Applied Sciences* **31**: 375–389 (2008).
- [19] “Recent Trends in the Kinetic Theory of Plasma Physics”, International Conference on Trends and Challenges in Applied Mathematics, Romania; Matrix Rom: 287-290 (2007).
- [20] “Global Existence and Increased Spatial Decay for the Radial Vlasov-Poisson System with Steady Spatial Asymptotics” *Transport Theory & Statistical Physics* **36**: 531–562 (2007).
- [21] “Local Existence for the One-Dimensional Vlasov-Poisson System with Infinite Mass” *Mathematical Methods in the Applied Sciences* **30**: 529–548 (2007).
- [22] “Global Existence for the Three-Dimensional Vlasov-Poisson System with Steady Spatial Asymptotics” *Communications in Partial Differential Equations* **31**: 349-370 (2006).
- [23] “The Vlasov-Poisson System with Infinite Mass and Energy”, Ph.D. Thesis, Carnegie Mellon University (2005).

FELLOWSHIPS, GRANTS, AND AWARDS

1. *Naval Research Council Grant* (PI), NARC 65-09, 2011-2013; \$59,254
2. *National Science Foundation Standard Research Grant* (PI), DMS 09-08413, 2009-2012; \$159,569
3. *Nominee and Finalist, Sixth Annual UTA Honors College Outstanding Faculty Award*, 2010.
4. *Center for Undergraduate Research in Mathematics (CURM) Mini-grant* (PI), subcontracted under NSF Grant DMS 06-36648, 2009-2010; \$19,850
5. *Research Enhancement Grant* (PI), UTA, 2009-2010; \$10,000
6. *Travel / Professional Development Award*, Office of Provost & Vice President for Academic Affairs, UTA, 2009, 2010; \$1,000
7. *Integrative Computational Sciences Grant* (PI), UTA, 2008-2009; \$5,000
8. *National Institutes of Health, Center for Physics-Based Simulation of Biological Structures (SimBioS) Grant* (co-PI), subcontracted under NIH Grant U54 GM072970, 2007-2008; \$50,000
9. *Travel Grants*: ICERM (2011), Kinetic Theory FRG (2011), Institute for Mathematical Sciences at National University of Singapore (2010), Texas Christian University (2010), Isaac Newton Institute at Cambridge University, UK (2010), University of Nebraska, Lincoln (2009, 2010, 2011), Universidad de Granada, Spain (2009), IPAM (2009), IMA (2008), Lefschetz Center for Dynamical Systems (2008), Universität Bayreuth, Germany (2007), Indiana University (2007), École Polytechnique (2007), Carnegie Mellon University (2003, 2004, 2005)
10. *NSF VIGRE Graduate Fellowship*, National Science Foundation, 2000 - 2004
11. *Student Leadership Award*, Carnegie Mellon University, May 2000
12. *Andrew Carnegie Scholarship*, Carnegie Mellon University, 1997 - 2000

GRADUATE AND UNDERGRADUATE RESEARCH

- United States Naval Academy
 1. Trident Scholar Project: Peter Roemer (2011-2012)
"A study of the persistence of HIV using stochastic differential equations"
 2. Senior Honors Project: Danica Konyk (2011-2012)
"Analysis of computational methods for an electromagnetic plasma"
 3. Senior Capstone Projects (2012) - 9 in total
- University of Texas at Arlington
 1. Numerous independent research projects with undergraduates during academic year

Student	Project	Honors/Publications	Year(s)
Charles Nguyen	*CURM program	B.S. Honors Thesis; Pub. [3]	2009-2010
Dustin Brewer	*CURM program	SIAM prize (2010); Pub. [7]	2009-2010
Robert Allen	*CURM program	Pub. [5]	2009-2010
Mihai Ionita	Honors Calculus		2009
Blake Arthur	Honors Calculus		2008
Adewumi Adegbenro	Honors Calculus		2008

*CURM Undergraduate Research Group Project - Magnetic Waves in One-dimensional Plasma: Well-posedness, Stability, Numerical Analysis, and Computation

2. Masters Thesis : Jennifer Anderson (2009-2010)
"Local Existence for the Vlasov Equation with a Transport Field" (see Publication [3])
Currently Ph.D candidate at Texas A&M University

- Indiana University
Senior Research Project: Jamil Ortoleva (2007-2008), Mathematical Tools of Multiscale Analysis for Bionanosystems (see Publication [16])
- Carnegie Mellon University
Teaching & Research Assistant within Center for Nonlinear Analysis (CNA) Summer REU (2001-2005): Assisted teams of undergraduate students on research projects in the Calculus of Variations, Mathematical Biology, and Mathematical Finance.

Student(s)	Project	Year
Carl Westine	"On the Pricing of Perpetual American Put Options"	2002
Derrick Dennis Liliana Martinez Dorian Smith	"Designing a roller coaster"	2004
Ruth Galaviz Alessa Kim Jillian Paulen	"Soap Films and Minimal Surfaces of Revolution"	2005
Amy Schollmeier Shelby Wilson	"Nim and its Variations"	2005
Mert Arslan	"Calculating Caps with Various Volatilities and a Brief Look at Forward Rates"	2005

INVITED AND CONTRIBUTED LECTURES

- ***2012:** AMS/MAA Joint Meetings, Boston, MA (Jan); PDE/Applied Mathematics Seminar, United States Naval Academy (Jan-Feb); Colloquium, Loyola University Chicago (Jan); Undergraduate Colloquium, Carleton College (Jan); Colloquium, California State University Channel Islands (Feb); Undergraduate Colloquium, Haverford College (Feb); AIMS Conference on Dynamical Systems and Differential Equations (July)
- **2011:** SIAM Conference on Analysis of PDE, San Diego, CA (Nov); AMS Fall Sectional Meeting, University of Utah (Oct); AMS Fall Sectional Meeting, University of Nebraska, Lincoln (Oct); PDE Seminar, University of Nebraska, Lincoln (Oct); Workshop on Vlasov Models in Kinetic Theory, ICERM (Sept); Undergraduate Seminar, USNA (Aug); AMS/MAA Joint Meetings, New Orleans, LA (Jan);
- **2010:** Basic Notions Seminar, USNA (Dec); Institute for Mathematical Sciences, National University of Singapore (Nov); Undergraduate Seminar, USNA, Topics in Mathematics (Nov/Dec); Frank Stones Research Lectureship, Texas Christian University (Oct); Isaac Newton Institute, Cambridge University, UK (Sep); MAA MathFest (with Undergraduate Research Group), Pittsburgh, PA (Aug); CURM Workshop (with Undergraduate Research Group), Provo, UT (March); Colloquium, Clemson University (March); Richard F. Barry Colloquium, Old Dominion University (Feb); Colloquium, United States Naval Academy (Feb); Colloquium, United States Air Force Institute of Technology (Feb); Colloquium, Santa Clara University (Feb); Colloquium, Fordham University (Feb); Colloquium, University of Central Florida (Feb); Colloquium, Miami (OH) University (Feb); Colloquium, College of Charleston (Jan); AMS/MAA Joint Meetings, San Francisco, CA (Jan);
- **2009:** SIAM Conference on Analysis of PDE, Miami, FL (Dec); Colloquium, University of Nebraska, Lincoln (Nov); PDE Seminar, Georgia Institute of Technology (Sep); Departamento de Matemàtica Aplicada, Universidad de Granada, Spain (July); Workshop on Quantum and Kinetic Transport, IPAM (April); PDE Seminar, North Carolina State University (March); IMACS Conference on Nonlinear Evolution Equations, University of Georgia (March);
- **2008:** Workshop on Multiscale Analysis and Computation (poster), IMA (Nov); DFW Research Day, UTA (Oct); SIAM Life Sciences 2008 (poster), Montreal, Canada (Aug); AMS Spring Sectional Meeting, Indiana University (April); Undergraduate Math Club, Indiana University (April); Colloquium, College of Staten Island (CUNY) (March); Colloquium, Fairfield University (March); Colloquium, Swarthmore College (Feb); Colloquium, Queen's College (CUNY) (Feb); Colloquium, University of Texas at Arlington (Feb); Colloquium, University of Missouri at St. Louis (Feb); Colloquium, Xavier University (Jan);
- **2007:** Center for Cell and Virus Theory Seminar, Indiana University (Dec); PDE Seminar, Mathematisches Institut, Universität Bayreuth, Germany (July); International Conference on Theoretical, Computational, and Applied Mathematics, Bucharest, Romania (June); PDE Seminar, Indiana University (April);
- **2006:** PDE Seminar, Indiana University (Oct);
- **2005:** Midwest PDE Seminar, University of Notre Dame (Dec); AMS Fall Sectional Meeting, University of Nebraska, Lincoln (Oct); PDE Seminar, Indiana University (Sep); PDE

Seminar, CMU (April); Colloquium, Goucher College (Feb); Undergraduate Colloquium, CMU (Jan)

- **Prior to Ph.D:** Center for Nonlinear Analysis Summer REU Colloquium, CMU (July 2001-2005); NAM Mathfest XIV, Morehouse College (Oct 2004); Colloquium, CMU (Oct 2004); PDE Seminar, CMU (Mar 2004); PDE Seminar, CMU (Oct 2002); NAM Mathfest XI, Florida A&M University (Oct 2001); Optimization Group Seminar, Sandia National Laboratories (Aug 2000) Center for Nonlinear Analysis Undergraduate Research Seminar, CMU (July 1999)

PROFESSIONAL SERVICE & OUTREACH

- **Referee/Reviewer:** Journal of Differential Equations (2); Journal of Physical Chemistry; SIAM Undergraduate Research Online; AIP Advances (2); Mathematical Methods in the Applied Sciences (4); SIAM Journal on Mathematical Analysis (2); Journal of Mathematical Analysis and Applications; PRIMUS: Problems, Resources, and Issues in Mathematics Undergraduate Studies (4); AIMS Conference on Differential Equations & Dynamical Systems; Calculus (Holt) textbook published by Prentice-Hall; AMS Mathematical Reviews (20-25)
- **Panel/Proposal Reviewer**
 1. Center for Undergraduate Research in Mathematics (CURM), 2010
 2. Math in the City (MitC) Program, University of Nebraska-Lincoln, 2010
 3. Indiana University Department of Mathematics Panel on Entering the Academic Workforce, 2010
- **Departmental Representative/Organizer:**
 1. Secretary & Treasurer, SIAM Washington-Baltimore Section (2011-)
 2. MD/DC/VA MAA Section NExT Fellow (2010-)
 3. Organizer & Founder, PDE/Applied Mathematics Seminar (2011-)
 4. Hiring Committee, Department of Mathematics, USNA (2010-)
 5. Honors Committee, Department of Mathematics, USNA (2010-)
 6. Majors Curriculum Committee, Department of Mathematics, USNA (2010-)
 7. Majors Recruitment Committee, Department of Mathematics, USNA (2010-)
 8. Combined Federal Campaign Keyperson, USNA (2010-)
 9. Multimedia Support Center Representative, USNA (2010-)
 10. Mathematical Association of America (MAA) Student Chapter Sponsor at UTA (2008-2010)
 11. Advisory Committee, Department of Mathematics, UTA (2009-2010)
 12. Mid-cities Math Circle Seminar Faculty (2009-2010)
 13. UTA University Hearing Board (2009-2010)
 14. Calculus Committee, Department of Mathematics, UTA (2009-2010)
 15. UTA Graduate Student Preliminary Examination Writer, Proctor, Grader (2008-2010)
 16. UTA Putnam Seminar Organizer (2008, 2009)

17. UTA Research and Creative Activity Group (2008-2010)
18. UTA Calculus Bowl Organizer (2008-2010)
19. UTA Teaching Circles Member (2008-2010)
20. UTA Preview Day - Department of Mathematics Representative (2008)
21. GAANN Day - Department of Mathematics Representative (2010)

• **Committee Member/Advisor**

1. Jennifer Anderson - Masters Defense, 2010 (chair; advisor)
2. Charles Nguyen - Honors Thesis Defense, 2010 (advisor)
3. Caixia (Ruby) Chen - Ph.D. Qualifying Examination, 2010 (chair: Yue Liu)
4. Alicia Prieto Langerica - Ph.D. Qualifying Examination, 2010 (chair: Hristo Kojouharov)
5. Stephen Salako - Ph.D. Defense, 2009 (chair: Goujun Liao)

• **Faculty Judge**

1. Annapolis Middle School Science Fair (2012)
2. UTA ACES Program, Graduate Student Presentations (2009, 2010)
3. Undergraduate Research Poster Session, AMS/MAA Joint Meetings (2009, 2010, 2011)
4. Indiana Women in Science Program (WISP) Research Conference (2007, 2008)

TEACHING EXPERIENCE

Instructor

United States Naval Academy (2010-)

- SM121: *Calculus I*
- SM233: *Introduction to Applied Mathematics*
- SM316: *Engineering Mathematics with Probability and Statistics*
- SM473: *Capstone- Mathematical Finance*
- SM486: *Advanced Topics in Mathematics*

University of Texas at Arlington (2008-2010)

- HONR-SC/MATH 1426: *Honors Calculus I*
- MATH 2425: *Calculus II*
- MATH 2326: *Calculus III*
- MATH 4191: *Putnam Seminar (co-taught)*
- MATH 4391: *Special Topics in Mathematics*
- MATH 4394: *Undergraduate Research Experiences*
- MATH 5350 (Grad): *Applied Mathematics I*
- MATH 5351 (Grad): *Applied Mathematics II*
- MATH 5395 (Grad): *Special Project in Mathematics Research*

Indiana University (2005 - 2008)

- M119: *Brief Survey of Calculus I*
- M211: *Calculus I*
- M212: *Calculus II*
- M365: *Introduction to Probability and Statistics*
- M441: *Partial Differential Equations with Applications I*
- M442: *Partial Differential Equations with Applications II*
- M472: *Numerical Analysis II*

Carnegie Mellon University (2001 - 2005)

- Math 21-118: *Differential and Integral Calculus*
- Math 21-120: *Calculus I for Economics Students*
- Math 21-259: *Calculus in 3D*

Pennsylvania State University, New Kensington/McKeesport Campuses (2004)

- Math 004: *Intermediate Algebra*
- Math 140: *Calculus I*

Teaching Assistant, Center for Nonlinear Analysis (CNA) Summer Institute, 2001-2005

Courses include: The Calculus of Variations, Convex Analysis, Computing with MAPLE, Introduction to Mathematical Finance.

Teaching Assistant, Carnegie Mellon University, August 1998 - May 2004

Courses include: Differential and Integral Calculus, Integration and Differential Equations, Calculus in 3D, Ordinary Differential Equations, Calculus I for Economics Students.

Teaching Assistant, Summer Academy for Minority Scholars, Summer 2004 (Pre-Calculus)

PROFESSIONAL MEMBERSHIPS

American Mathematical Society (AMS)

Society for Industrial and Applied Mathematics (SIAM)

Mathematical Association of America (MAA)

National Alliance for Doctoral Studies in the Mathematical Sciences - Undergraduate Mentor

National Alliance for Doctoral Studies in the Mathematical Sciences - Graduate Mentor

Pi Mu Epsilon (PME) - inducted 1998

REFERENCES

- | | | |
|---|--|-----------------------------|
| 1. Prof. Jack Schaeffer (<i>advisor</i>) | Carnegie Mellon University | <i>js5m@math.cmu.edu</i> |
| 2. Prof. Robert Glassey | Indiana University | <i>glassey@indiana.edu</i> |
| 3. Prof. Peter Ortoleva | Center for Cell & Virus Theory
Indiana University | <i>ortoleva@indiana.edu</i> |
| 4. Prof. Charles Livingston (<i>teaching</i>) | Indiana University | <i>livingst@indiana.edu</i> |
| 5. Prof. William Hrusa | Carnegie Mellon University | <i>wh15@cmu.edu</i> |
| 6. Prof. Geoff Price (<i>dept. head</i>) | United States Naval Academy | <i>glp@usna.edu</i> |