

Curriculum Vitae

Tianshi Lu

PERSONAL INFORMATION:

Title: Associate Professor
Address: Department of Mathematics and Statistics
Wichita State University
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EDUCATION:

Ph.D. *Applied Mathematics*, Stony Brook University, August 2005.
Advisors: James Glimm, Roman Samulyak.
Thesis: *Direct Numerical Simulation of Bubbly Flows and Interfacial Dynamics of Phase Transitions.*

M.A. *Mathematics*, University of Wisconsin - Madison, May 2001.
M.S. *Physics*, New York University, Jan. 1999.
B.S. *Physics*, Fudan University, Shanghai, China, July 1997.

EMPLOYMENT:

2012.5 – present Wichita State University, Dept. of Mathematics, Statistics, and Physics
Associate Professor in mathematics.

2008.8 – 2012.5 Wichita State University, Department of Mathematics and Statistics
Assistant Professor in mathematics.

2007.12 – 2008.8 Brookhaven National Laboratory, Computational Science Center
Assistant Computational Scientist on computational fluid dynamics.

2005.9 – 2007.11 Brookhaven National Laboratory, Computational Science Center
Research Associate on computational fluid dynamics.

2006.9 – 2006.12 Stony Brook University, Dept. of Applied Mathematics and Statistics
Visiting Scholar.

2001.9 – 2005.8 Stony Brook University, Dept. of Applied Mathematics and Statistics
Research Assistant, Teaching Assistant.

2000.9 – 2001.8 University of Wisconsin – Madison, Department of Mathematic
Teaching Assistant.

1997.9 – 2000.8 New York University, Department of Physics
Teaching Assistant.

MEMBERSHIP:

SIAM (Society for Industrial and Applied Mathematics), *APS* (American Physical Society),
AMS (American Mathematical Society), *Sigma Xi*, The Scientific Research Society.

AWARDS AND GRANTS:

Wichita State University NIAR Research Fund, \$6K, Summer 2013.

Wichita State University ARCS Award, \$4K, Summer 2012.

Wichita State University LAS Summer Support Fellowship, \$4K, Summer 2011.

Kansas NSF EPSCoR First Award, \$110K, July 2010 – September 2012.

Sigma Xi Excellence in Research Award, Stony Brook University, 2005.

Meyer Fellowship, New York University, 1997.

COURSES TAUGHT:

MATH 243	Calculus II	F11, SF12, F13, S14-15, F16-17, S18
MATH 344	Calculus III	F2008, S2010, F2010, S2016, F2016
MATH 451	Comput Math using MATLAB	Fall 2014
MATH 511	Linear Algebra	Spring 2010, Fall 2015
MATH 551	Numerical Methods	Spring 2011, Spring 2014
MATH 555	Differential Equations	SF09, F11, S13, S16, S17, F18, SF19
MATH 751	Numerical Linear Algebra	F2008-10, F2012, F2014-19
MATH 852	Numerical Analysis of PDEs	S2009, S2011, S2013, S2017, S2019
MATH 981	Independent Study Applied Math	Fall 2010, Spring 2011
MATH 985	PhD Dissertation	Fall 2011 – Spring 2014
AMS 210	Applied Linear Algebra	Fall 2006 (<i>Stony Brook University</i>)

GRADUATE STUDENTS ADVISED:

Ph.D.	Sirvan Rahmati	<i>current</i>
	Lei Wang	May 2019
	Patrick Rinker	July 2015 (<i>2nd place at GRASP Symposium 2012</i>)
M.S.	Qi Li	July 2010

THESIS AND DISSERTATION COMMITTEES:

Ph.D.	Yahya Nasersharifi, Yufei Wang, Saman Sahraei, Saud Alghamdi, Li Liang, Mohamed Badreddine, Lun Li, Rehab Alsultan, Arijit Banerjee, Maryssa Metheny, Everett Kropf.
M.S.	James Reimer, Rong Li, Nan Jiang, Huabo Lu, Lun Li, Georges Tchankwe, Soha Hamdan, Muhammad Usman Khan, Amanda Ralphs, Paul Johnson.

COMMITTEES:

2019 – present	Graduate Council
2019 – present	College Curriculum Committee
2013 – present	Undergraduate Assessment Committee
2009 – present	Textbook Committees for MATH 451, 551, 751 and 851
2009 – present	Ph.D. Qualifying Examination Committee
2012 – 2016	Faculty Senator for the Senate of Wichita State University
2010 – 2012	Departmental Colloquium Coordinator
2009 – 2012	Putnam Mathematics Competition Instructor and Coordinator

SERVICES:

2017 – present	Coordinating the Graduate Seminar
2009 – present	Holding Math Placement Exams at Wichita State University

2014 Lecturing in the Math Circle for grade school students
Fall 2012 Mentoring undergraduate student James Allen in McNair Scholars Program
March 2011 Presenting energy-related research to the Kansas delegation in Washington, DC
June 2008 Educational talk on *Introduction to Advanced Computational Software (ACTS) Collection* at the New York Center for Computational Science Seminar

EDITORIAL SERVICES:

ASME Journal of Fluids Engineering, Journal of Applied Physics, Applied Physics Letters, Mathematical Reviews, and International Journal of Engineering Practical Research

COMPUTER PROGRAMMING:

C/C++, MATLAB, MPI parallel computation, LATEX.

EXPERIENCES AND FIELDS OF INTEREST:

Development of the FronTier-MHD software for multiphase computational fluid dynamics and magnetohydrodynamics simulations.

Dynamic phase transition in cavitating and boiling flows, bubbly flows, free surface flows, interfacial instability, shock waves, and computational plasma physics.

Modeling and simulation of lightning arc root damage in metal and composite panels.

Efficient numerical schemes for hyperbolic systems and electromagnetic waves, front tracking, and high performance computing.

Computational quantum optics, spectral functions.

RESEARCH PAPERS:

1. **T. Lu**, N. Leonenko, C. Ma. Series representations of isotropic vector random fields on balls. *Stat. Probabil. Lett.* **156**, 108583 (2020).
2. **T. Lu**, C. Ma. Isotropic covariance matrix functions on compact two-point homogeneous spaces. *J. Theor. Probab.* (2019). <https://doi.org/10.1007/s10959-019-00920-1>
3. **T. Lu**, T. Jeffres, K. Kirsten. Zeta function of self-adjoint operators on surfaces of revolution. *J. Phys. A: Math. Theor.* **48**, 145204 (2015).
4. **T. Lu**. Wave propagation in bubbly fluids and cavitation mitigation. *Wave Propagation*, Ed. Gomes Mateus, Academy Publish, 309-332 (2014).
5. Y. Kostogorova-Beller, **T. Lu**. Numerical Modeling of Experimentally Obtained Lightning Arc Root Damage in Metal Sheets. *Int'l J. Eng. Prac. Res.* **2**, 139-147 (2013).
6. T. Jeffres, K. Kirsten, **T. Lu**. Zeta function on surfaces of revolution. *J. Phys. A: Math. Theor.* **45**, 345201 (2012).
7. **T. Lu**. Population Inversion by Chirped Pulses. *Phys. Rev. A* **84**, 033411 (2011).
8. P. B. Parks, **T. Lu**, R. Samulyak. Charging and $E \times B$ Rotation of Ablation Clouds Surrounding Refueling Pellets in Hot Fusion Plasmas. *Physics of Plasmas* **16**, 060705 (2009).
9. **T. Lu**, J. Du, R. Samulyak. A Numerical Algorithm for Magnetohydrodynamics of Ablated Materials. *J. Nanosci. Nanotechnol.* **8**, 3674-3685 (2008).

10. **T. Lu**, Z. L. Xu, J. Glimm, R. Samulyak, X. M. Ji. Dynamic Phase Boundaries for Compressible Fluids. *SIAM J. Sci. Comput.* **30**, 895-915 (2008).
11. R. Samulyak, **T. Lu**, P. Parks, J. Glimm, X. Li. Simulation of Pellet Ablation for Tokamak Fueling with ITAPS Front Tracking. *Journal of Physics: Conf. Series* **125**, 012081 (2008).
12. **T. Lu**, X. Miao, H. Metcalf. Nonadiabatic Transitions in Finite-Time Adiabatic Rapid Passage. *Phys. Rev. A* **75**, 063422 (2007).
13. **T. Lu**, R. Samulyak, J. Glimm. Direct Numerical Simulations of Bubbly Flows and Application to Cavitation Mitigation. *J. Fluids Eng.* **129**, 595-604 (2007).
14. R. Samulyak, **T. Lu**, P. B. Parks. A Magnetohydrodynamics Simulation of Pellet Ablation in the Electrostatic Approximation. *Nucl. Fusion* **47**, 103-118 (2007).
15. J. Glimm, B. Fix, X.L. Li, J. Liu, X. Liu, **T. Lu**, R. Samulyak, Z. Xu. Front Tracking under TSTT. *Astronomical Society of the Pacific* **359**, 15-24 (2006).
16. Z. Xu, M. Kim, **T. Lu**, W. Oh, J. Glimm, R. Samulyak, X. Li, C. Tzanos. Discrete Bubble Modeling of Unsteady Cavitating Flow. *Int. J. Multiscale Comp. Eng.* **4**, 601-616 (2006).
17. R. Samulyak, Y. Prykarpatsky, **T. Lu**, J. Glimm, Z. Xu, M.N. Kim. Comparison of Heterogeneous and Homogenized Numerical Models of Cavitation. *Int. J. Multiscale Comp. Eng.* **4**, 377-390 (2006).
18. **T. Lu**, X. Miao, H. Metcalf. The Bloch Theorem on the Bloch Sphere. *Phys. Rev. A* **71**, 061405 (2005).
19. H. Jin, X.F. Liu, **T. Lu**, B. Cheng, J. Glimm, D.H. Sharp. Rayleigh-Taylor Mixing Rates for Compressible Flow. *Phys. Fluids* **17**, 024104 (2005).
20. R. Samulyak, **T. Lu**, Y. Prykarpatsky. Direct and Homogeneous Numerical Approaches to Multiphase Flows and Applications. *Lecture Notes in Computer Science* **3039**, 653-660 (2004), Springer-Verlag Berlin Heidelberg.

PRESENTATIONS:

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|-----------|--|
| Oct. 2019 | Super-convergence of DG Method for Scalar Nonlinear Conservation Laws,
T. Lu , S. Rahmati.
5th Annual Meeting of SIAM Central States Section, Ames, IA. |
| Apr. 2015 | Simulation of Pellet Ablation in Tokamaks,
T. Lu , P. Rinker.
1st Annual Meeting of SIAM Central States Section, Rolla, MO. |
| May 2013 | Simulation of Pellet Ablation in Tokamaks,
T. Lu , P. Rinker.
1st Central Region Conference on Numerical Analysis & Dynamical Systems,
Lawrence, KS. |
| Jan. 2012 | Simulation of Pellet Ablation in DIII-D,
T. Lu , P. Rinker.
Kansas NSF EPSCoR Conference, Wichita, KS. |
| Nov. 2011 | Simulation of Pellet Ablation in DIII-D,
T. Lu , P. Rinker.
53rd Annual Meeting of the APS Division of Plasma Physics,
Salt Lake City, Utah. |

- July 2011 Scaling Laws for Pellet Ablation in Tokamaks,
T. Lu, P. Rinker.
7th International Congress on Industrial and Applied Mathematics,
Vancouver, Canada.
- June 2011 Modeling of Multiphase Magnetohydrodynamics in Tokamaks,
T. Lu, P. Rinker.
International Conference on Applied Mathematics and Interdisciplinary Research,
Tianjin, China.
- Nov. 2010 Scaling Laws for Pellet Ablation in Tokamaks,
T. Lu, P. Rinker.
52nd Annual Meeting of APS Division of Plasma Physics, Chicago, Illinois.
- Oct. 2010 Multiphase Magnetohydrodynamics in Tokamaks,
T. Lu, P. Rinker.
Kansas NSF EPSCoR Conference, University of Kansas, Lawrence, KS.
- Mar. 2010 Theory and Computation of the Grad-Shafranov Equation,
T. Lu.
Computational Applied Math Seminar, Stony Brook, New York.
- Nov. 2009 Intrinsic Rotation of Pellet Ablation Clouds,
P. Parks, **T. Lu**, and R. Samulyak.
51st Annual Meeting of APS Division of Plasma Physics, Atlanta, Georgia.
- July 2009 Multiphase MHD at Low Magnetic Reynolds Numbers,
T. Lu.
10th US National Congress on Computational Mechanics, Columbus, Ohio.
- July 2009 Multiphase MHD at Low Magnetic Reynolds Numbers,
T. Lu.
General Atomics Seminar, San Diego, California.
- Nov. 2008 Multiphase MHD at Low Magnetic Reynolds Numbers,
T. Lu.
Inverse Problem Seminar, Wichita State University, Wichita, KS.
- July 2008 Multiphase Algorithm and Simulation for MHD of Ablated Materials,
T. Lu, J. Du and R. Samulyak.
2008 SIAM Annual Meeting, San Diego, California.
- July 2008 Fourth Order Embedded Boundary Method for the Maxwell Equations,
L. Wu, R. Samulyak and **T. Lu**.
2008 SIAM Annual Meeting, San Diego, California.
- June 2008 Dynamic Phase Boundaries for Compressible Fluids,
T. Lu, Z. Xu and R. Samulyak.
12th International Conference on Hyperbolic Problems, College Park, MD.
- June 2008 Introduction to Advanced Computational Software (ACTS) Collection,
T. Lu.
New York Center for Computational Science Seminar, Stony Brook University, NY.
- Mar. 2008 Multiphase MHD at Low Magnetic Reynolds Numbers,
T. Lu, R. Samulyak, P. Parks and J. Du.
2008 AMS Spring Eastern Meeting, Courant Institute, New York.

- Feb. 2008 Multiphase MHD at Low Magnetic Reynolds Numbers,
T. Lu, R. Samulyak, P. Parks and J. Du.
AMS Graduate Student Conference, Stony Brook, New York.
- Jan. 2008 Multiphase Computational Fluid Dynamics with Applications,
T. Lu.
Wichita State University, Wichita, Kansas.
- Nov. 2007 Charging and Rotation of Pellet Ablation Cloud,
R. Samulyak, **T. Lu** and P. Parks.
49th Annual Meeting of APS Division of Plasma Physics, Orlando, Florida.
- Sep. 2007 4th order Embedded Boundary FDTD algorithm for Maxwell Equations,
L. Wu, R. Samulyak and **T. Lu**.
COMPASS All Hands Meeting, Fermilab, Batavia, Illinois.
- Apr. 2007 MHD Simulation of Pellet Ablation in Tokamak,
T. Lu and R. Samulyak.
CSC Seminar, Brookhaven National Laboratory, Upton, New York.
- Mar. 2007 Front Tracking Multiphase Code - FronTier,
T. Lu and R. Samulyak.
BNL / CMR-RPI Collaboration Meeting, RPI, Troy, New York.
- Nov. 2006 Dynamic Phase Boundaries for Compressible Fluids,
T. Lu, Z. L. Xu, R. Samulyak and J. Glimm.
59th Annual Meeting of APS Division of Fluid Dynamics, Tampa Bay, Florida.
- Oct. 2006 Axisymmetric MHD Simulations of Pellet Ablation,
R. Samulyak, **T. Lu** and P. Parks.
48th Annual Meeting of APS Division of Plasma Physics, Philadelphia, PA.
- Oct. 2006 Observation of Large Optical Forces in Modulated Light,
X. Miao, **T. Lu**, E. Wertz, M. G. Cohen and H. Metcalf.
Laser Sciences XXII, Rochester, NY.
- July 2006 Numerical Algorithms for MHD of Flows of Ablated Materials,
R. Samulyak, **T. Lu**, J. Du and P. Parks.
7th World Congress on Computational Mechanics, Los Angeles, California.
- July 2006 Axisymmetric MHD Simulations of Pellet Ablation,
R. Samulyak, **T. Lu** and P. Parks.
CPPG Seminar, Princeton Plasma Physics Laboratory, Princeton, New Jersey.
- July 2006 Observation of Large Optical Forces in Modulated Light,
X. Miao, **T. Lu**, E. Wertz, M. G. Cohen and H. Metcalf.
20th International Conference on Atomic Physics, Innsbruck, Austria.
- May 2006 Nonadiabatic Transitions in Adiabatic Rapid Passage,
T. Lu, X. Miao and H. Metcalf.
37th Annual Meeting of APS Division of AMO Physics, Knoxville, Tennessee.
- Mar. 2006 Pressure Driven Liquid-Vapor Phase Transitions,
T. Lu, R. Samulyak and J. Glimm.
2006 APS March Meeting, Baltimore, MD.

- Dec. 2005 Direct Numerical Simulation of Bubbly and Cavitating Flows and Applications to Cavitation Mitigation, R. Samulyak and **T. Lu**.
Mitigation of Cavitation Damage Erosion in Liquid Metal Spallation Targets, Oak Ridge National Laboratory / Spallation Neutron Source, Tennessee.
- Oct. 2005 Direct Numerical Simulation of Bubbly Flows and Interfacial Dynamics of Phase Transitions, **T. Lu**, R. Samulyak and J. Glimm.
Computational Science Center, Brookhaven National Laboratory, New York.
- July 2005 Theory and Simulation of Compressible Two-Phase Flows with Phase Transition, **T. Lu**, R. Samulyak and J. Glimm.
2005 SIAM Annual Meeting, New Orleans, Louisiana.
- May 2005 Direct Numerical Simulation of Bubbly Flows and Application to the Mitigation of Cavitation Erosion, **T. Lu**, R. Samulyak and J. Glimm.
2nd Conference on Frontiers in Applied & Computational Math, Newark, NJ.
- May 2005 Properties of Multiple Adiabatic Rapid Passage Sequences,
X. Miao, **T. Lu** and H. Metcalf.
36th Annual Meeting of APS Division of AMO Physics, Lincoln, Nebraska.
- Jan. 2004 Modeling and Simulations of Cavitating and Bubbly Flows,
R. Samulyak, **T. Lu** and Y. Prykarpatskyy,
Muon Collider / Neutrino Factory Collaboration Meeting, Riverside, CA.
- Nov. 2003 Direct and Continuous Numerical Simulations of Bubbly Flows,
T. Lu, R. Samulyak and J. Glimm.
56th Annual Meeting of APS Division of Fluid Dynamics, East Rutherford, NJ.