

Curriculum Vitae

Tianshi Lu

PERSONAL INFORMATION:

Title: Assistant Professor
Address: Department of Mathematics and Statistics
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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. Advisor: **Jerome Percus.**

B.S. Physics, Fudan University, Shanghai, China, July 1997.

EMPLOYMENT:

2008.8 - present Department of Mathematics and Statistics, Wichita State University
Assistant Professor in applied mathematics.

2005.9 - 2008.8 Computational Science Center, Brookhaven National Laboratory
Assistant Computational Scientist on computational fluid dynamics.
Research Associate on computational fluid dynamics.

Fall 2006 Dept. of Applied Mathematics and Statistics, Stony Brook University
Visiting Scholar, teaching *Applied Linear Algebra*.

2001.9 – 2005.8 Dept. of Applied Mathematics and Statistics, Stony Brook University
Research Assistant on computational fluid dynamics.
Teaching Assistant for *Graph Theory*.

2000.9 – 2001.8 Department of Mathematic, University of Wisconsin - Madison
Teaching Assistant for *Calculus I & II* and *ODE*.

1997.9 – 2000.8 Department of Physics, New York University
Teaching Assistant for *General Physics* and *Physics Labs*.

AWARD:

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

Meyer Fellowship, New York University, 1997.

MEMBERSHIP:

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

COMPUTER PROGRAMMING:

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

FIELDS OF INTEREST:

High performance computing, MHD, free surface/multiphase CFD, with applications in bubbly flows, phase transitions, interfacial instability, shock waves and plasma/tokamak physics.

Efficient numerical schemes for hyperbolic systems and electromagnetic waves, front tracking. Quantum computing, adiabatic rapid passage.

RESEARCH PAPERS:

1. **T. Lu**, J. Du, R. Samulyak. A Numerical Algorithm for Magnetohydrodynamics of Ablated Materials. *J. Nanosci. Nanotechnol.* **8**, 3674-3685 (2008).
2. **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).
3. 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).
4. **T. Lu**, X. Miao, H. Metcalf. Nonadiabatic Transitions in Finite-Time Adiabatic Rapid Passage. *Phys. Rev. A* **75**, 063422 (2007).
5. **T. Lu**, R. Samulyak, J. Glimm. Direct Numerical Simulations of Bubbly Flows and Application to Cavitation Mitigation. *J. Fluids Eng.* **129**, 595-604 (2007).
6. R. Samulyak, **T. Lu**, P. B. Parks. A Magnetohydrodynamics Simulation of Pellet Ablation in the Electrostatic Approximation. *Nucl. Fusion* **47**, 103-118 (2007).
7. 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).
8. 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).
9. 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).
10. **T. Lu**, X. Miao, H. Metcalf. The Bloch Theorem on the Bloch Sphere. *Phys. Rev. A* **71**, 061405 (2005).
11. 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).

12. R. Samulyak, **T. Lu**, Y. Prykarpatskyy. Direct and Homogeneous Numerical Approaches to Multiphase Flows and Applications. *Lecture Notes in Computer Science* **3039**, 653-660 (2004), Springer-Verlag Berlin Heidelberg.
13. P. B. Parks, **T. Lu**, R. Samulyak, Charging and $E \times B$ Rotation of Ablation Clouds Surrounding Refueling Pellets in Hot Fusion Plasmas, submitted to *Physics of Plasmas*.

PRESENTATIONS:

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|-----------|---|
| 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. |
| June 2008 | Dynamic Phase Boundaries for Compressible Fluids,
T. Lu , Z. Xu and R. Samulyak.
12 th International Conference on Hyperbolic Problems, College Park, MD. |
| 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.
49 th Annual Meeting of APS Division of Plasma Physics, Orlando, Florida. |
| Sep. 2007 | 4 th 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.
59 th 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.
48 th 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. Prykarpatsky,
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.