

CONTACT
INFORMATION

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RESEARCH
INTERESTS

My research interests include the construction, analysis, and implementation of models and numerical methods in computational fluid dynamics and computational materials science, and related problems in scientific computing and engineering. Specifically, the topics that I am interested in are:

- Modeling and computation for viscous flows of non-newtonian fluids with complex suspensions
- Entropy-stable difference schemes for Navier-Stokes equations and shallow water equations
- Numerical simulations of martensitic phase transition and microstructure
- Numerical methods for free boundary and moving interface problems

EDUCATION

The University of Maryland, College Park, Maryland USA

Ph.D., Applied Mathematics and Scientific Computation (AMSC), GPA 4.0 **August 2007**

- Dissertation Topic: "Entropy-stable approximations of nonlinear conservation laws"
- Advisor: Eitan Tadmor

Nanjing University, Nanjing, Jiangsu China

B.S., Computational Mathematics, GPA 3.2 **June, 2000**

PROFESSIONAL
EXPERIENCES

Corning Incorporated, Corning, New York USA

Industrial Postdoctoral Associate **September 2008-**
Science & Technology Division

Conducted research on the multi-scale modeling and computation of complex poly-disperse suspensions with applications in the rheology of extrusion flows.

Statistical and Applied Mathematical Sciences Institute, Durham, North Carolina USA

Postdoctoral Fellow **September 2007-August 2008**

Conducted research on the modeling and computation of complex biological fluids using the mixed Lagrangian-Eulerian methods for multiscale and heterogeneous materials, and distributed-memory parallel computation with MPI. Coordinated workshops in 2007/08 program on random media.

North Carolina State University, Raleigh, North Carolina USA

Postdoctoral Fellow **September 2007-August 2008**

Center for Research in Scientific Computation

Conducted research on the analysis and computation of free boundary and moving interface problems. Implemented the immersed interface method and level set method for solving partial differential equations with interface and irregular domains.

National Institute of Health, Bethesda, Maryland USA

Research Associate **June 2007-August 2007**

Laboratory of Immunology, National Institute of Allergy and Infectious Diseases(NIAID)

Developed numerical simulations for the study of pathogenesis of HIV infection. Constructed numerical methods for systems of ordinary differential equations, and nonlinear programming.

The University of Maryland, College Park, Maryland USA

Graduate Research Assistant **September 2003-May 2007**

Center for Scientific Computation and Mathematical Modeling(CSCAMM)

Constructed, analyzed, and implemented novel entropy-stable numerical scheme of nonlinear conservation laws with the applications in computational fluid dynamics using finite difference and finite volume methods for hyperbolic and hyperbolic-parabolic equations.

Instructor **Summer 2006/07**

Department of Mathematics

Sole classroom contact, gave lectures on Calculus in different levels, prepared and graded all tests, quizzes, and homework.

Teaching Assistant

Fall 2002-Spring 2007

Department of Mathematics

Stand-alone lecturer. Led close-contact discussion sessions on Calculus, Linear Algebra, and Probability. Graded tests, homework, and MATLAB assignments for classes on Linear Algebra and Differential Equations. Provided intensive and extensive tutorial services for Computational Methods, Differential Equations, Mathematical Modeling, and Calculus.

Wake Forest University, Winston Salem, North Carolina USA

Teaching Assistant

Spring 2002

Department of Mathematics

Tutored undergraduate level calculus course. Graded homework assignments and exams.

OHARU Enterprise Internet Service Corporation, Nanjing, China

Software Engineer

July 2000-June 2001

Group of Management Information System(MIS) Development

Designed and developed a client/server-based order-processing system and PC-based multi-user front-desk cashier application for a supermarket retailer that operated grocery stores in Taiwan. Programmed Microsoft Windows client application and communication between the client and database server running Oracle 7.

PUBLICATIONS

E. Tadmor and W. Zhong. Entropy-stable approximations of Navier-Stokes equations with no artificial numerical viscosity. *Journal of Hyperbolic Differential Equations*, 3(3):529-559, 2006.

E. Tadmor and W. Zhong. Novel entropy-stable approximations of 1D and 2D fluid models. In *Hyperbolic Problems: Theory, Numerics, Applications: Proceedings of the 11th International Conference on Hyperbolic Problems, Theory, Numerics, Applications*, 1111-1119, Springer, 2008.

E. Tadmor and W. Zhong. Energy-preserving and stable approximations for the two-dimensional shallow water equations. Submitted to the proceedings of the Abel Symposium 2006, Springer, 2007.

E. Tadmor, E. S. Titi, and W. Zhong. On the vanishing Leray- α and related smoothing models of nonlinear conservation laws. In preparation.

**PROFESSIONAL
PRESENTATIONS**

Entropy-stable approximations of fluid equations and numerical simulations of fluid-structure interaction. Talk in the Weekly Information Forum, Science & Technology Division, Corning Incorporated, Corning, New York, September, 2008.

Introduction of parallel implementation of multiscale methods for complex fluids. Talk in the Post-doc/Graduate Student Seminar, Statistical and Applied Mathematical Sciences Institute, Durham, North Carolina, November, 2007.

Novel entropy-stable approximations of 1D and 2D fluid models. Invited talk in CSE Student Prize Session, SIAM Conference on Computational Science and Engineering, Costa Mesa, California, February, 2007.

On discrete version of the second law of thermodynamics. Contributed talk in the 11th International Conference on Hyperbolic Problems, Theories, Numerics, Applications, Lyon, France, July, 2006.

On the entropy-stable approximations of Navier-Stokes equations with no artificial dissipation. Contributed talk in SIAM Annual Meeting, Boston, Massachusetts, July, 2006.

Numerical simulation of martensitic phase transition and microstructure. Talk in the scientific computing student seminar, University of Maryland, College Park, Maryland, May, 2004.

Fast summation of Helmholtz monopoles in two dimensions. Talk in the research interaction group of fast multipole methods, University of Maryland, College Park, Maryland, December, 2003.

**RESEARCH
PROJECTS**

Modeling and simulation of flows of highly packed complex ceramic suspensions. 2008-2010. Advisor: Dr. Amy Rovelstad, Science & Technology Division, Corning Incorporated.

Modeling and simulation of complex fluids and soft matter materials. 2007-2008. Advisor: Dr. M. Gregory Forest, Department of Mathematics & Biomedical Engineering, the University of North Carolina at Chapel Hill.

Analysis and computation of fluid mixture model of tissue deformations. 2007-2008. Advisor: Dr. Zhilin Li, Department of Mathematics, North Carolina State University.

Numerical simulation of the development and homeostasis of T-cell memory. 2007. Advisor: Dr. Martin Meier-Schellersheim, Laboratory of Immunology, NIAID, National Institute of Health.

A study of entropy-stable numerical schemes for compressible fluids. 2004-2007. Advisor: Dr. Eitan Tadmor, CSCAMM & Department of Mathematics, the University of Maryland at College Park.

Numerical simulation in 2D martensitic phase transition and microstructure. 2003-2004. Advisor: Dr. Bo Li, Department of Mathematics, the University of Maryland at College Park.

Multilevel fast multipole method for the Helmholtz equation in two dimensions. 2003. Advisor: Dr. Ramani Duraiswami and Dr. Nail A. Gumerov, Institute of Advanced Computer Studies (UMIACS), Computer Science Department, the University of Maryland at College Park.

Finite element method for general elliptic problems. 2003. Advisor: Dr. Howard Elman, Institute of Advanced Computer Studies (UMIACS), Computer Science Department, the University of Maryland at College Park.

Parallel solver for large linear system, 1999-2000. Advisor: Dr. Dongshen Fu, Department of Mathematics, Nanjing University.

AWARDS

The University of Maryland, College Park, Maryland USA

<i>5-year Teaching Assistantship and summer funding,</i> Dept. of Math.	August 2002-May 2007
<i>Research Assistantship,</i> NSF Research Grant #DMS04-07704	June 2005-July 2007
<i>Travel Award,</i> CSCAMM	July 2006, February 2007
<i>Student Travel Award,</i> Levermore Foundation, Dept. of Math.	July 2006, February 2007
<i>Jacob K. Goldhaber Travel Award,</i> Graduate School	July 2006

SIAM Conference on Computational Science and Engineering, Costa Mesa, California USA

Finalist in BGCE student paper competition **February 2007**

11th International Conference on Hyperbolic Problems, Lyon, France

Student Travel Award **July 2006**

IMA Workshop on Multiscale Modeling and Simulation, Minneapolis, Minnesota USA

IMA Student Travel Award **November 2004**

Nanjing University, Nanjing, China

Renmin Scholarship **September 1999 - June 2000**

SERVICES

Statistical and Applied Mathematical Sciences Institute, Durham, North Carolina USA

Referee, IMA Journal of Numerical Analysis, **September 2007-March 2008**

The University of Maryland, College Park, Maryland USA

<i>Treasurer,</i> AMSC Student Council,	August 2006-June 2007
<i>Treasurer,</i> SIAM Chapter,	August 2006-June 2007
<i>Graduate Student Mentor,</i> AMSC Program,	August 2005-June 2007
<i>Vice President,</i> Chinese Student and Scholar Association,	August 2003-July 2004

The Department of Energy Workshop, North Bethesda, Maryland USA

Scribe, Mathematical Research Challenges in Optimization of Complex systems, **December 2006**

SKILLS

Tools: Matlab, Microsoft Visual Studio, Fluent, GNU Vim/Emacs, L^AT_EX

Languages: C/C++, Fortran, Pascal, HTML, Matlab scripts, SQL scripts, Unix shell scripts

Operating Systems: Linux(various distributions), Unix(SunOS/Solaris), Windows NT/XP(Win32)

PROFESSIONAL AFFILIATIONS

American Mathematical Society (AMS)

Society for Industrial and Applied Mathematics (SIAM)