

# Curriculum Vitae of Yongmin Zhang

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## EDUCATION

Institution Attended	From	To	Degree	Date	Field
University of Chicago	10/91	6/97	Ph.D.	6/97	Applied Mathematics
University of Chicago	10/90	6/91	M.S.	6/91	Applied Mathematics
Fudan University	9/85	7/89	B.S.	7/89	Mathematics

### Doctoral Dissertation Topic

Numerical Solutions of Variational Inequalities

Research supervisor: Professor Todd Dupont

## RESEARCH INTERESTS

Financial Mathematics and Financial Engineering: American options, exotic options, real options, mortgage pipeline fallout modeling, mortgage backed securities, fixed income risk management, interest rate models, real estate finance, mean-variance efficient portfolio

Numerical Modeling for Free Boundary Problems

Computational Fluid Dynamics: interface tracking, shock wave, radiation and combustion processes in supernova explosions, stochastic fluid mixing, Monte Carlo simulations for turbulent flow

## PROFESSIONAL EXPERIENCE

Employer	Title and Field	From	To
Wells Fargo	Risk Management Consultant Capital Market Finance	9/08	present
J. P. Morgan Chase (formerly Washington Mutual)	Lead Research Analyst Capital Market Research	6/07	8/08
State University of New York at Stony Brook	Assistant Professor Appl. Mathematics & Statistics	9/01	5/07
Research Foundation of SUNY	Research Scientist Appl. Mathematics & Statistics	9/97	8/01
University of Chicago	Lecturer Mathematics	9/92	8/97

## HONORS

Grants, awards, fellowships, honorary societies or degrees, etc.

## Grants

(Co-Principal Investigator) NNSA, Department of Energy, “Modeling and Simulation of Fluid Mixing for Laser Experiments and Supernova”, 2006-2009, \$375,000 (\$125,000 to Y. Zhang).

(Co-Principal Investigator) Department of Energy, “Multiscale Stochastic Simulation and Modeling”, 2002-2006, \$1,200,000 (\$220,000 to Y. Zhang).

(Co-Principal Investigator) NNSA, Department of Energy, “Turbulent and Interfacial Mixing”, 2002-2003, \$215,000 (\$55,000 to Y. Zhang).

## Fellowships

College Fellow in Mathematics, University of Chicago (1991-1992).

University Fellow in Mathematics, University of Chicago (1990-1991).

Hong Kong Wong Foundation Fellowship, 1990.

### Honors and Awards

Invited speaker (45 minutes) at Fourth World Congress of Nonlinear Analysis, Orlando, Florida, June 30 - July 7, 2004.

Outstanding Paper Award at the Eleventh Annual Conference on Applied Mathematics, 1995.

French U. A. P. Prize in Mathematics, 1989.

### PUBLICATIONS

See attached pages.

### CITATION LIST

(Taken from Scientific Citation Index. 2001-2008 inclusive)

article	number of citations
<i>Mathematics and Computers in Simulation</i> , 65, 417-430, 2004.	3
<i>Lecture Notes in Computational Science</i> , 2668, 782-790, 2003.	2
<i>SIAM Journal on Multiscale Modeling and Simulation</i> , 1, 458-484, 2003.	5
<i>Astrophysical Journal</i> , 564, 2, 896-908, 2002.	27
<i>Journal of Statistical Physics</i> , 107(1-2), 241-260, 2002.	8
<i>SIAM Journal on Scientific Computing</i> , 24(1), 208-236, 2002.	14
<i>Computers and Mathematics with Applications</i> , 41, 1505-1513, 2001.	1
<i>Computers and Mathematics with Applications</i> , 48, 1733-1747, 2004.	1
Total (up to 06/30/2008)	61

## INVITED LECTURES, PAPERS, ETC.

1. 60 minutes talk, Financial Mathematics Seminar, University of Minnesota, Twin City, February 27, 2009
2. 60 minutes talk, IMA/MCIM, Industrial Problems Seminar, University of Minnesota, Twin City, February 27, 2009
3. 60 minutes talk, Department of Mathematics, University of Leicester, United Kingdom, October 20, 2008
4. 60 minutes talk, Division of Mathematical Science, Nanyang Technological University, Singapore, September 17, 2008
5. 60 minutes talk, School of Systems & Enterprises, Stevens Institute of Technology, New Jersey, July 28, 2008
6. 60 minutes talk, Capital Market Research, Fannie Mae, Washington DC, July 24, 2008
7. 60 minutes talk, Department of Finance, School of Business, Quinnipiac University, Connecticut, March 2, 2008
8. 60 minutes talk, Maseeh Mathematics & Statistics Colloquium Series, Portland State University, December 2, 2005.
9. Invited session organizer and speaker, Third MIT Conference on Computational Fluid and Solid Mechanics, June 14-17, 2005, Cambridge, MA
10. 60 minutes talk, Applied Mathematics Seminar, New Jersey Institute of Technology, April 8, 2005.
11. 30 minutes talk, SIAM Annual Meeting, July 12-16, 2004.
12. 45 minutes invited speaker, at Fourth World Congress of Nonlinear Analysis, Orlando, Florida, June 30 - July 7, 2004.
13. 30 minutes invited speaker, Fourth International Conference on High Energy Density Laboratory Astrophysics, Ann Arbor, Michigan, February 23-25, 2002.
14. 30 minutes talk, SIAM Annual Meeting, July 9-13, 2001.
15. 60 minutes talk, departmental seminar, Northwestern University, 1997.
16. 60 minutes talk, departmental seminar, University of Illinois at Chicago, 1997.
17. 60 minutes talk, departmental seminar, Penn State University, 1997.
18. 60 minutes talk, departmental seminar, University of Alberta, 1997.
19. 60 minutes talk, departmental seminar, North Carolina State University, 1997.
20. 60 minutes talk, departmental seminar, State University of New York at Stony Brook, 1997.
21. 60 minutes talk, departmental seminar, Argonne National Laboratory, 1997.
22. 60 minutes talk, departmental seminar, Oak Ridge National Laboratory, 1997.

## OTHER PRESENTATIONS

23. SIAM Conference on Analysis of Partial Differential Equations, July 10-12, 2006, Boston, “Monotonicity and Stability of Numerical Solutions for Obstacle Problems”.
24. SIAM Annual Meeting, July 10-14, 2006, Boston, “Numerical Modeling of Fluid Mixing for Laser Experiments and Supernova”.
25. APS DFD 58th Annual Meeting, November 20-22, 2005, Chicago, “Modeling and Simulation of Fluid Mixing for Laser Experiments and Supernova”.
26. Frontier in Applied and Computational Mathematics, NJIT, May 13-15, 2005, “Modeling and Simulation of Fluid Mixing for Laser Experiments and Supernova”, (poster presentation)
27. SIAM Annual Meeting, July 12-16, 2004, Portland, OR, “Supernova Simulations by Front Tracking Methods”.
28. Conference on Analysis, Modeling and Computation of PDE and Multiphase Flow, Aug. 3-5, 2004, Stony Brook, NY. “Supernova and ICF Simulations by Front Tracking Methods”.
29. Frontiers in Applied and Computational Mathematics, May 21-22, 2004, New Jersey Institute of Technology. “Supernova and ICF Simulations by Front Tracking Methods”.
30. 56th Annual Meeting of the Division of Fluid Dynamics, East Rutherford, New Jersey, November 23-25, 2003. “Front Tracking for Multiphase Fluid Mixing”.
31. Multiphase Flow 2003, Computational Methods in Multiphase Flow Santa Fe, New Mexico, November 3-5, 2003. “Front Tracking for Multiphase Fluid Mixing”.
32. The 2003 International Conference on Computational Science and Its Applications, Montreal, Canada, May 18-21, 2003. “A Fast Algorithm for Moving Interface Problems”.
33. SIAM Annual Meeting, July 9-13, 2001. “Numerical Study of Axisymmetric Richtmyer-Meshkov Instability and Azimuthal Effect on Spherical Mixing”.
34. SIAM Annual Meeting, July 10-14, 2000. “Three dimensional axisymmetric simulations of fluid instabilities in curved geometry”.
35. Third International Conference on Advances in Fluid Mechanics, May 2000, Montreal, Canada. “Three dimensional axisymmetric simulations of fluid instabilities in curved geometry”.
36. Eleventh Annual Conference on Applied Mathematics, 1995, “Multilevel Projection Algorithm for Obstacle Problems”.

## RECENT DEPARTMENTAL SERVICE

Committees, Special Programs, etc. Give dates of service.

Member, CAM Postdoc Search Committee, 2001-2007.

Member, Ph.D Defense Committee for William Garber, Yan Yu, Youngeun Kim, Tianshi Lu, Srabasti Dutta, Bin Xu, Jingjie Liu, 2001-2007

Member, Ph.D Preliminary Exam Committee for Srabasti Dutta, Yan Yu, Xinfeng Liu, Tianshi Lu, Taewon Lee, Ming Zhao, Bin Xu, Dongyung Kim, Paul Levergne, 2001-2007

## PROFESSIONAL SERVICE OUTSIDE UNIVERSITY

Offices held, committees, programs, special studies, etc. Give details and dates of service.

Organizer, Minisymposium, Third MIT Conference on Computational Fluid and Solid Mechanics, June 14-17, 2005.

Grant reviewer, U. S. Department of Energy

Book reviewer, Cambridge University Press

Book reviewer, Houghton Mifflin Publishing Company

Referee, Journal of Nonlinear Analysis

Referee, Applied Numerical Mathematics

Referee, Applied Mathematics Letter

Referee, Computer and Mathematics with applications

Referee, INFORMATION Journal

Referee, ASME Journal of Fluids Engineering

Referee, International Journal for Numerical Methods in Fluids

Referee, Journal of Zhejiang University

Referee, Journal of Computational and Applied Mathematics

Referee, Surface and Coatings Technology

Referee, Applied Mathematics and Computation

## TEACHING ACTIVITY

Titles of courses taught at Stony Brook, with dates, catalogue number, and approximate number of students in course.

“Probability Theory,” AMS 569; 10 students; Spring 1998.

“Numerical Analysis I,” AMS 526; 12 students; Fall 1999.

“Numerical Analysis III,” AMS 528; 5 students; Fall 1999.

“Wave Propagation,” AMS 565; 8 students; Spring 2000.

“Analytical Methods for Applied Mathematics and Statistics,” AMS 510; 18 students; Fall 2000.

“Linear Algebra,” AMS 210; 50 students; Spring 2001.

“Numerical Analysis,” AMS 326; 25 students; Fall 2001.

“Compressible Fluid Dynamics,” AMS 566; 8 students; Fall 2001.

“Linear Algebra,” AMS 210; 50 students; Spring 2002.

“Numerical Analysis,” AMS 326; 20 students; Fall 2002.

“Compressible Fluid Dynamics,” AMS 566; 3 students; Fall 2002.

“Numerical Analysis II” AMS 527; 15 students; Spring 2003.

“Numerical Analysis,” AMS 326; 30 students; Fall 2003.

“Compressible Fluid Dynamics,” AMS 566; 8 students; Fall 2003.

“Survey of Probability and Statistics,” AMS 310; 50 students; Spring 2004.

“Numerical Analysis,” AMS 326; 25 students; Fall 2004.

“Compressible Fluid Dynamics,” AMS 566; 5 students; Fall 2004.

“Survey of Probability and Statistics,” AMS 310; 50 students; Spring 2005.

“Numerical Analysis,” AMS 326; 20 students; Fall 2005.

“Compressible Fluid Dynamics,” AMS 566; 6 students; Fall 2005.

“Wave Propagation,” AMS 565; 5 students; Spring 2006.

“Numerical Analysis,” AMS 326; 26 students; Fall 2006.

“Applied Linear Algebra,” AMS 505; 20 students; Fall 2006.

“Applied Complex Analysis,” AMS 503; 15 students; Spring 2007.

Activities and materials (such as syllabi, textbooks, and teaching aids) designed to improve the instructional program (key to list of courses above when appropriate).

Created a website for the teaching of AMS 326 and AMS 310 courses. This website contains syllabus, teaching schedule, grade policy, homework assignments, solutions

to the homework assignments, lecture notes, and Matlab and C++ programs. This website has been welcome by the students of these courses as a convenient venue for deepening the classroom lectures and student-teacher communication.

Graduate dissertations completed or being written under direction of professor.

Former Ph. D. students: Srabasti Dutta and Paul Lavergne.

#### REFERENCES SUGGESTED BY CANDIDATE

Name	Title	Address
Todd Dupont	Professor	Department of Computer Science University of Chicago Chicago, IL 60637 dupont@cs.uchicago.edu (773)702-3485
James Glimm	Professor & Chair	Department of Applied Mathematics State University of New York at Stony Brook Math Tower Stony Brook, New York 11790 glimm@ams.sunysb.edu (631)632-8355
R. Paul Drake	Professor	Space Physics Research Laboratory University of Michigan 2455 Hayward Street Ann Arbor, Michigan 48109 rpdrake@umich.edu (734)763-4072
John W. Grove	Senior Scientist	Continuum Dynamics Group Computer and Computational Science Division Los Alamos National Laboratory Los Alamos, NM 87545 jgrove@lanl.gov (505)667-0723
Wei Zhu	Professor	Department of Applied Mathematics State University of New York at Stony Brook Math Tower Stony Brook, New York 11790 zhu@ams.sunysb.edu (631)632-8374
Jianping Zhu	Professor & Chair	Department of Mathematics



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## PUBLICATIONS

## Papers for Refereed Publications

1. Y. Zhang, "American Option Pricing Model as an Obstacle Problem," working paper, 2009.
2. P. Cheng, Z. Lin, Y. Liu, and Y. Zhang, "Serial Persistence and Holding Period Dependence of Real Estate Risk," *Real Estate Economics*, to be submitted, 2009.
3. Y. Zhang, "A two-dimensional flame tracking algorithm with application to type Ia supernova," *Nonlinearity*, 22, 1909-1925, 2009.
4. Y. Zhang, "Extension and Application of Discrete Maximum Principle to Obstacle Problems," *SIAM J. Numerical Analysis*, under review, 2007.
5. Y. Zhang, R. P. Drake, and J. Glimm, "Numerical Evaluation of Impact of Laser Preheat on Interface Structure and Instability," *Physics of Plasma*, 14, 062703, 2007.
6. Z. Xu, J. Glimm, Y. Zhang, and X. Liu, "A Multiscale Front Tracking method for Compressible Free Surface Flows," *Chemical Engineering Science Journal*, 62 (13): 3538-3548, 2007.
7. Y. Zhang, "Convergence of Free Boundaries in Discrete Obstacle Problems," *Numerische Mathematik*, 106:157-164, 2007.
8. Y. Zhang, "Monotone Convergence of Finite Element Approximation of Obstacle Problems," *Applied Mathematics Letters*, 20, 445-449, 2007.
9. Y. Zhang, J. Glimm, and S. Dutta, "Tracked Flame Simulation for Type Ia Supernova," In *Computational Fluid and Solid Mechanics*, K. J. Bathe, editor, 950-953, Elsevier 2005.
10. Y. Zhang, R. P. Drake, J. Glimm, J. W. Grove, and D. H. Sharp, "Radiation Coupled Front Tracking Simulations for Laser Driven Shock Experiments," *Nonlinear Analysis*, 63/5-7, pp. e1635-e1644, 2005.
11. S. Dutta, E. George, J. Glimm, J. Grove, H. Jin, T. Lee, X. Li, D. H. Sharp, K. Ye, Y. Yu, Y. Zhang, and M. Zhao, "Shock Wave Interactions in Spherical and Perturbed Spherical Geometries," *Nonlinear Analysis*, 63/5-7, pp. 644-652, 2005.
12. S. Dutta, J. Glimm, J. W. Grove, D. H. Sharp, and Y. Zhang, "Spherical Richtmyer-Meshkov instability for axisymmetric flow," *Mathematics and Computers in Simulation*, 65 (2004) 417-430.
13. S. Dutta, J. Glimm, J. W. Grove, D. H. Sharp, and Y. Zhang, "Error Comparison in Tracked and Untracked Spherical Simulations," *Computers & Mathematics with Applications*, 48, 1733-1747, 2004.

14. J. Glimm, H. Jin, and Y. Zhang, "Front Tracking for Multiphase Fluid Mixing," In A. A. Mammoli and C. A. Brebbia, editors, *Computational Methods in Multiphase Flow II*, pp. 13-22, WIT Press, Southampton, UK, 2004.
15. Y. Zhang, "Error Estimates for the Numerical Approximation of Time-dependent Flow of Bingham Fluid in Cylindrical Pipes by the Regularization Method," *Numerische Mathematik*, Vol 96, No. 1, 153-184, 2003.
16. S. Dutta, J. Glimm, J. W. Grove, D. H. Sharp, and Y. Zhang, "A Fast Algorithm for Moving Interface Problems," *Lecture Notes in Computational Science* 2668: 782-790, 2003.
17. J. Glimm, H. Jin, M. Laforest, F. Tangerman, and Y. Zhang, "A Two Pressure Numerical Model of Two Fluid Mixtures," *SIAM J. Multiscale Modeling and Simulation*, 1:458-484, 2003.
18. R. P. Drake, H. F. Robey, O. A. Hurricane, Y. Zhang, B. A. Remington, J. Knauer, J. Glimm, D. Arnett, J. O. Kane, K. S. Budil, J. W. Grove "Experiments to produce a hydrodynamically unstable spherically diverging system of relevance to instabilities in supernovae," *Astrophysical Journal*, Vol. 564, 2, 896-908, 2002.
19. J. Glimm, J. W. Grove, Y. Zhang, and S. Dutta, "Numerical Study of Axisymmetric Richtmyer-Meshkov Instability and Azimuthal Effect on Spherical Mixing," *J. Stat. Physics*, Vol. 107, nos 112, 241-260, 2002.
20. J. Glimm, J. W. Grove, and Y. Zhang, "Interface Tracking for Axisymmetric Flows," *SIAM J. Sci. Comp.*, Vol 24, No. 1, 208-236, 2002.
21. Y. Zhang, "Multilevel Projection Algorithm for Obstacle Problems," *Computers and Mathematics with Applications* 41 (2001) 1505-1513.
22. J. Glimm, J. W. Grove, and Y. Zhang, "Three Dimensional Axisymmetric Simulations of Fluid Instabilities in Curved Geometry," In M. Rahman and C. A. Brebbia, editors, *Advances in Fluid Mechanics III*, 643-652, WIT press, Southampton, UK, 2000.
23. Y. Zhang, "A Posterior Error Analysis of a Two-level Scheme for Solving the Obstacle Problem," *INFORMATION*, Vol. 3, No. 4, 469-477, October 2000.

Non-Refereed Papers, Report and Other Articles:

24. Y. Zhang "A New Fallout Model for Mortgage Pipeline Valuation," Internal Report, Capital Market Finance, Wells Fargo, 2009.
25. Y. Zhang "Transition Probabilities between Statuses for Rate Locks," Internal Report, Capital Market Finance, Wells Fargo, 2009.
26. Y. Zhang "Reverse Mortgage Cash Flow Modeling," Internal Report, Capital Market Finance, Wells Fargo, 2008.
27. Y. Zhang "Look back options with hurdle adjustment," Internal Report, Capital Market Finance, Wells Fargo, 2008.

28. Y. Zhang “Valuation and Hedging for Mortgage Backed Securities,” Report, Capital Market Research Group of Washington Mutual, 2008.
29. Y. Zhang “Numerical Measurement of Impact of Laser Preheat in Laboratory Astrophysics Experiments,” *Proceeding of SIAM Annual Meeting*, 2006.
30. Y. Zhang, “Monotonicity and Stability of Numerical Solutions for Obstacle Problems,” *Preprint*, 2006.
31. Y. Zhang, J. Glimm, S. Dutta, and P. Lavergne, “Interface Tracking for Reactive Flows with Application to Type Ia Supernova,” *Preprint*, 2006.
32. S. Dutta, J. Glimm, and Y. Zhang, “LES Simulations of Turbulent Combustion in a Type Ia Supernova,” University at Stony Brook preprint number AMS-05-05, 2005.
33. Y. Zhang, J. Glimm, and R. P. Drake, “Modeling and Simulation of Fluid Mixing for Laser Experiments and Supernova,” *Bulletin of American Physical Society*, Vol. 50, No. 9, pp. 178, 2005.
34. J. Glimm, J. Grove, and Y. Zhang, “Numerical Calculation of Rayleigh-Taylor and Richtmyer-Meshkov Instabilities for Three Dimensional Axisymmetric flows in Cylindrical and Spherical Geometries,” *Los Alamos Laboratory, Report# LA-UR99-6796*, 1999.
35. Y. Zhang, “Numerical Solution of Variational Inequalities,” Ph.D thesis, University of Chicago, 1997.
36. Y. Zhang, “A Monotonicity Principle and  $L^\infty$ -Error Bound for a Discrete Obstacle Problem,” Technical Report (TR-96-21), University of Chicago, 1996.