

JAMES A. SETHIAN

Current Employment
Professor of Mathematics
James H. Simons Chair in Mathematics
University of California, Berkeley
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Head/Senior Scientist
Mathematics Department
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Date/Place of Birth
1954, Washington, D.C.
Education
Ph.D. Applied Mathematics, Univ. of Cal., Berkeley, 1982
M.A. Mathematics, Univ. of Cal., Berkeley, 1978
B.A. Princeton University, 1976

Employment
Professor, Dept. of Mathematics, UC Berkeley: Current
Department Head, Mathematics, LBNL: 1996-Current
Associate Professor, Dept. of Mathematics, UC , Berkeley: 1988-1991
Assistant Professor, Department of Mathematics, UC , Berkeley: 1985-1988
NSF Postdoctoral Fellow, Courant Institute of Mathematics, NYU, 1984-1985
NSF Postdoctoral Fellow, LBNL, 1982-1984

Visiting Positions
Frei University, Technical University, Humboldt University, Berlin, 2011-2012
Acting Director, Thinking Machines Corporation, 1993
National Institute of Standards and Technology, 1990
University of Maryland, 1990
Courant Institute of Mathematics, NYU, 1984-1985
National Center for Atmospheric Research, 1978-1980

Awards and Honors:

US National Academy of Sciences, 2013
Fellow, American Mathematical Society (Initial Class of Fellows, 2012)
Cozzarelli Prize, National Academy of Sciences, 2012
Pollak Prize Lecture, Technion, Israel, Oct. 2011
ICIAM Pioneer Prize, 2011, Vancouver Canada
Einstein Fellowship Prize, Berlin Einstein Stiftung, July 2011, Berlin
Richard von Mises Lecture, 200th Anniversary Celebration of Humboldt University, Berlin, 2010
Invited Address, Joint Meeting, AMS-MAA, Washington, 2009
Fellow, Society for Industrial and Applied Mathematics (SIAM), initial class of Fellows, 2009
US National Academy of Engineering, 2008
Norbert Wiener Prize, Joint AMS-SIAM, 2004
Lighthill Lecturer, British Applied Mathematics Conference, March 2003
Invited Lecture, International Congress of Mathematicians, Beijing, 2002
Plenary Lecture, Australian Mathematical Society, Sept. 2001

I.E. Block Community Lecture Prize, SIAM Annual Meeting, Puerto Rico, July 2000
Plenary Lecture, Int. Congress of Industrial and Applied Mathematics, Edinburgh, 1999.
Plenary Speaker, ACM Conference on Computational Geometry, June, 1998.
Plenary Lecture, ENUMATH '97, Heidelberg, Sept., 1997
Robert Noyce Distinguished Teaching Prize, 1995
Plenary Invited Lecture, Supercomputer '93, Portland, November 1993
Presidential Young Investigator Award, National Science Foundation, 1987.
Alfred P. Sloan Foundation Fellow, 1986-1988
National Science Foundation Mathematical Sciences, Post-Doctoral Fellow, 1983-1985
Bernard Friedman Prize, Most Outstanding Doctoral Dissertation Applied Mathematics,
Sciences, and Engineering, University of California, Berkeley, 1982
National Research Council High Priority Engineering Postdoctoral Fellowship, 1982

Publications

1. *Normal Modes of the Giss Atmospheric Circulation Model* with Williamson, D.L., Durran, D., and Dee, D. NCAR Technical Report, National Center for Atmospheric Research May, 1982
2. *An Analysis of Flame Propagation* (PhD Thesis), University of California, Berkeley. Lawrence Berkeley Laboratory Report 14125, June, 1982
3. *Turbulent Combustion in Open and Closed Vessels*, Journal of Computational Physics, 54, 3, June 1984, pp.425-456.
4. *The Wrinkling of a Flame Due to Viscosity*, Fire Dynamics and Heat Transfer, Editors: J.G. Quintiere, R.A. Alpert and R.A. Altenkirch, HTD, ASME, New York, New York, 25, 1983, pp.29-32.
5. *Numerical Simulation of Flame Propagation in a Closed Vessel*, Notes on Numerical Fluid Mechanics, Editors: Pandolfi, M. and Piva, R., Proceedings of the Fifth GAMM-Conference on Numerical Methods in Fluid Mechanics, Rome, October 5-7, 1983, Friedr. Vieweg & Sohn, Braunschweig/Wiesbaden, 1984, pp. 324-331.
6. *Some Numerical Methods for Discontinuous Flows in Porous Media*, with P. Colella and P. Concus, The Mathematics of Reservoir Simulation, R. Ewing, Editor, SIAM Volume on Frontiers in Applied Mathematics, SIAM Publications, Philadelphia, PA., 1984, pp. 161-186.
7. *Numerical Solution of the Buckley Leverett Equations*, with Chorin, A.J., and Concus, P., Proceedings, Seventh Society of Petroleum Engineers Reservoir Simulation Symposium, San Francisco, California, November 1983, pp.197-200.
8. *Capillary Pressure and the Modified Random Choice Method for Porous Flow*, with P. Concus and E. Kostlan, Proceedings of the Sixth International Conference on Computing Methods in Applied Sciences and Engineering, Versailles, France, Dec. 12-16, 1983.
9. *Search, Encounter Rates and the Evolution of Anisogamy*, with Cox, P.A., submitted by E.O. Wilson, Proceedings of the National Academy of Sciences, Evolution 81, 1984, pp. 6078-6079.
10. *Gamete Motion, Search, and the Evolution of Anisogamy, Oogamy and Chemotaxis*, with P.A. Cox, American Naturalist, 125, January, 1985.
11. *Derivation and Numerical Solution of the Equations of Low Mach Number Combustion*, with Majda, A., Combustion Science and Technology, 42, 1984, pp. 185-205.
12. *Vortex Methods and Turbulent Combustion*, American Mathematical Society Publications, Lectures in Applied Mathematics, 22, 1985.
13. *Curvature and the Evolution of Fronts*, Communications of Mathematical Physics, 101, 4, 1985.
14. *Dynamics of Turbulent Structure in a Recirculating Flow; A Computational Study*, with Ghoniem, A.F., AIAA 23rd Aerospace Sciences Meeting, AIAA-85-0146, Reno, Nevada, Jan.14-17, 1985
15. *Effect of Reynolds Number on the Structure of Recirculating Flow*, with Ghoniem, A.F., AIAA Journal, 25, 1, 1987.
16. *Numerical Methods for Propagating Fronts*, Variational Methods for Free Surface Interfaces, Editors: P. Concus and R. Finn, Springer-Verlag, 1987.
17. *Large Eddy Interaction with Propagating Flames*, in "Computational Fluid Mechanics and Reacting Gas Flows", Editors: B. Engquist, A. Majda, Institute for Mathematics and Its Applications, IMA Vol. 12, 1988.
18. *Validation Study for Vortex Methods*, with A.F. Ghoniem, Jour. Comput. Phys., 74, 283, 1988.
19. *Fronts Propagating with Curvature-Dependent Speed: Algorithms based on Hamilton-Jacobi Formulations*, with S. Osher, J. Comp. Phys., 79, pp.12-49, (1988).
20. *The Design of Algorithms for Hypersurfaces moving with Curvature-Dependent Speed*, in Nonlinear Hyperbolic Equations-Theory, Numerical Methods, and Applications, Notes on Numerical Fluid Mechanics, 24, Ballman, J. and Jeltsch, R. Eds., Vieweg, 1988.
21. *Interactive Scientific Visualization and Parallel Display Techniques*, With J. Salem, and A.F. Ghoniem, Proceedings of Supercomputing '88, IEEE, Lake Buena Vista, Florida, 1988.
22. *On Measuring the Accuracy of the Vortex Method: On Using a Random Method to Model Stable and Unstable Flow*, in Vortex Methods, C. Anderson and C. Greengard, Eds., Lecture Notes in Mathematics, 1360, Springer-Verlag, New York, 1988.

23. *Animation of Interactive Flow Visualization Tools on a Data Parallel Machine*, with J. Salem, Inter. Jour. SuperComp. Appl., 3.2, (1989).
24. *A Connection Machine Implementation of Tracer Flow Particle Visualization*, in Proceedings of the Conference on Scientific Applications of the Connection Machine, with J. Salem, Ed. Simon, H., World Scientific, New Jersey, 1989.
25. *A Review of Recent Numerical Algorithms for Hypersurfaces Moving with Curvature-Dependent Speed*, J. of Diff. Geom., 31, pp. 131-161, (1989).
26. *The Collapse of a Dumbbell Moving Under its Mean Curvature*, in Geometric Analysis and Computer Graphics, P. Concus, R. Finn, D. Hoffman, Eds., Mathematical Sciences Research Institute Publications, Springer-Verlag, 1991.
27. *Video-Based Scientific Visualization*, in Geometric Analysis and Computer Graphics, P. Concus, R. Finn, D. Hoffman, Eds., Mathematical Sciences Research Institute Publications, Springer-Verlag, 1991.
28. *Vortex Methods and Vortex Motion*, Eds. K. Gustafson and J.A. Sethian, SIAM Publications, Philadelphia, 1991.
29. *A Brief Overview of Vortex Methods*, in Vortex Methods and Vortex Motion, Eds. K. Gustafson and J.A. Sethian, SIAM Publications, Philadelphia, 1991.
30. *A Gallery of Fluid Motion using Vortex Methods*, in Vortex Methods and Vortex Motion, Eds. K. Gustafson and J.A. Sethian, SIAM Publications, Philadelphia, 1991.
31. *Animation Tools for Interactive Flow Visualization*, with James Salem, Transactions of the American Nuclear Society, 1990.
32. *Computing Interface Motion in Compressible Gas Dynamics*, with W. Mulder and S.J. Osher, J. Comp. Phys., 100, 2, pp. 209-228 (1992).
33. *Crystal Growth and Dendrite Formation*, with J. Strain, J. Comp. Phys. 98, 2, pp. 231-253, (1992).
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35. *A Parallel Implementation of the Random Vortex Method*, with J.P. Brunet, A. Greenberg, J. Mesirov, in Plenary Lectures and Expanded Selected Papers from the IMACS 1st International Conference on Computational Physics, Boulder, USA, 11-15 June 1990, Editors: K. Gustafson and W. Wyss, North-Holland, Elsevier-Science Publications, B.V., The Netherlands, 1991.
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38. *Computing the Motion of Curves and Evolving Surfaces*, in Computing Optimal Geometries, J. Taylor, Ed. American Mathematical Society Publications, Video Publications, 1991.
39. *Projection Methods Coupled to Level Set Interface Techniques*, with J. Zhu, J. Comp. Phys., 102, 1, pp.128-138, 1992.
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51. *Computational Fluid Mechanics and Massively Parallel Processors*, IEEE Supercomputer '93, Portland, Oregon, IEEE Publications, pp.74-82, ACM Transactions, 1993.
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55. *Dynamical Behavior of a Premixed Turbulent Open V-Flame*, with C. Rhee and L. Talbot, J. Fluid Mechanics, 300, pp. 87–115, 1995.
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60. *Image Processing via Level Set Curvature Flow*, with R. Malladi, Proceedings of the National Academy of Sciences, Vol. 92(15), pp. 7046–7050, July 1995.
61. *Image Processing: Flows under Min/Max Curvature and Mean Curvature*, with R. Malladi, Graphical Models in Image Processing, 58(2) pp. 127-141, March, 1996.
62. *Level Set Techniques for Tracking Interfaces; Fast Algorithms, Multiple Regions, Grid Generation and Shape/Character Recognition*, Proceedings of the Levico Conference, 1994, Ed. A. Damlamian, J. Spruck, and A. Visintin, Gakuto International Series, Vol. 5, Tokyo, 1995.
63. *A Unified Approach to Noise Removal, Image Enhancement, and Shape Recovery*, with R. Malladi, IEEE Transactions on Image Processing, 5, 11, pp. 1154-1168, 1996.
64. *Theory, Numerics, and Algorithms of Level Set Techniques for Propagating Interfaces*, Acta Numerica, 1996.
65. *A Fast Marching Level Set Method for Monotonically Advancing Fronts*, Proceedings of the National Academy of Sciences, 93, 4, 1996.
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69. *An Overview of Level Set Methods for Etching, Deposition, and Lithography Development*, with D. Adalsteinsson, IEEE Transactions on Semiconductor Devices, 1996. 10, 1, pp.167-184.
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79. *Level Set and Fast Marching Methods in Image Processing and Computer Vision*, with R. Malladi, Proceedings of IEEE International Conference on Image Processing, Lausanne, Switzerland, Sept. 16-19, 1996.
80. *A Geometric Approach to Segmentation and Analysis of 3D Medical Images*, with R. Malladi, R. Kimmel, D. Adalsteinsson, G. Sapiro, and V. Caselles, A Geometric Approach to Segmentation and Analysis of 3D Medical Images, Proceedings of IEEE/SIAM Workshop on Mathematical Methods in Biomedical Image Analysis, pp. 244-252, San Francisco, CA, June 1996.
81. *Flows under Min/Max Curvature and Mean Curvature: Applications in Image Processing*, with R. Malladi, Proceedings of the Fourth European Conference on Computer Vision, LNCS Vol. 1064, pp. 251-261, University of Cambridge, Cambridge, England, April 1996.
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83. *A Real-Time Algorithm for Medical Shape Recovery*, with R. Malladi, in *Proceedings of ICCV '98*, Bombay India, pp. 304-310, 1998.
84. *Three dimensional traveltimes computation using the Fast Marching Method*, with M. Popovici, 64,2, Geophysics, 1999.
85. *Numerical Schemes for the Hamilton-Jacobi and Level Set Equations on Triangulated Domains*, with T. Barth, J. Comp. Phys., 145, 1, pp. 1-40, 1998
86. *Adaptive Fast Marching and Level Set Methods for Propagating Interfaces*, Acta Numerica, Proceedings of ALGORITHMMY '97, Zuberec, 1997.
87. *The Fast Construction of Extension Velocities in Level Set Methods*, with D. Adalsteinsson, 148, J. Comp. Phys., 1999, pp. 2-22.
88. *Fast Marching Methods on Triangulated Domains*, with R. Kimmel, Proc. Nat. Acad. Sci., 37, 1, pp. 5253-5261, 1998.

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91. *Level Set Methods and Fast Marching Methods*, Cambridge University Press, 1999.
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93. *Fast Voronoi Diagrams and Offsets on Triangulated Surfaces*, with R. Kimmel, Proceedings of AFA Conference on Curves and Surfaces, Saint-Malo, France, July, 1999
94. *Motion by Intrinsic Laplacian of Curvature Marching Methods*, with D. Chopp, Interfaces and Free Boundaries, 1, 107–123, 1999.
95. *Advancing Interfaces: Level Set and Fast Marching Methods*, Plenary Address, Proceedings of the International Congress on Industrial and Applied Mathematics, 1999.
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108. *Fast Phase Space Computation of Multiple Arrivals*, with S. Fomel, Proceedings of the National Academy of Sciences, 99, 11, pp. 7329-7334, 2002.
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119. *Simulating Complex Tumor Dynamics from Avascular to Vascular Growth using a General Level Set Method*, with C.S. Hogea and B.T. Murray J. Mathematical Biology, 53, 1, 2005.
120. *A Coupled Quadrilateral Grid Level Set Projection Method Applied to Ink Jet Simulation*, with J. Yu and S. Sakai, J. Computational Physics, 206, 1, pp. 227-251, 2005.
121. *Wave breaking over sloping beaches using a coupled boundary integral-level set method*, with M. Garzon, Internat. Ser. Numer. Math. 154 (2006), pp. 189-198.
122. *Two-Phase Viscoelastic Jetting*, with J. Yu and S. Sakai, Journal of Computational Physics, 220, 2, pp. 568-585, 2007
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