

**UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN  
COLLEGE OF ENGINEERING**

**Name:** Michael Thomas Heath  
**Department:** Computer Science  
**Present Academic Rank:** Professor Emeritus  
**Date:** March 7, 2022



**Academic Degrees**

Ph.D.	Computer Science	Stanford University	1978
M.S.	Mathematics	University of Tennessee	1974
B.A.	Mathematics	University of Kentucky	1968

**Academic Positions Held**

- Professor Emeritus, Dept. of Computer Science, UIUC, 2012–present.
- Fulton Watson Copp Chair Emeritus, Dept. of Computer Science, UIUC, 2012–present.
- Interim Head, Department of Computer Science, UIUC, 2007–2009.
- Fulton Watson Copp Chair, Dept. of Computer Science, UIUC, 2002–2012.
- Director, Center for Simulation of Advanced Rockets, UIUC, 1997–2010.
- Director, Computational Science and Engineering, UIUC, 1996–2012.
- Professor, Dept. of Computer Science, UIUC, 1991–2012.
- Adjunct Professor, Dept. of Computer Science, University of Tennessee, Knoxville, 1988–1991.

**Other Professional Employment**

- Senior Research Scientist, National Center for Supercomputing Applications, UIUC, 1991–2000.
- Senior Computer Scientist, Center for Supercomputing Research and Development, UIUC, March 1991–August 1991.
- Senior Research Staff Member, Oak Ridge National Laboratory, 1986–1991.
- Computer Science Group Leader, Oak Ridge National Laboratory, 1984–1991.
- Research Staff Member, Oak Ridge National Laboratory, 1981–1986.
- Eugene P. Wigner Postdoctoral Fellow, Oak Ridge National Laboratory, 1978–1981.
- Scientific Applications Programmer, Oak Ridge National Laboratory, 1968–1974.

## Awards and Honors

### Teaching Awards

- Taylor L. Booth Education Award, IEEE Computer Society, 2009.
- Engineering Council Award for Excellence in Advising, 2003.
- Campus Award for Excellence in Graduate and Professional Teaching, UIUC, 2002.
- Honorable Mention, Campus Award for Excellence in Undergraduate Teaching, UIUC, 1999.
- William L. Everitt Award for Teaching Excellence, College of Engineering, UIUC, 1998.
- List of Teachers Ranked Excellent by Their Students, UIUC: Fall 1991, Fall 1993, Spring 1995, Fall 1999, Fall 2000, Fall 2001, Spring 2002, Fall 2002, Fall 2003, Spring 2004, Spring 2008, Spring 2009, Fall 2011, Fall 2012, Fall 2013, Fall 2015.

### Research Awards

- Associate Fellow, American Institute of Aeronautics and Astronautics, 2010.
- SIAM Fellow, Society for Industrial and Applied Mathematics, 2010.
- Apple Award for Innovation in Science (one of ten awarded nationally), 2007.
- Member, European Academy of Sciences, 2002.
- Recognition of Service Award, Association for Computing Machinery, 2001.
- ACM Fellow, Association for Computing Machinery, 2000.
- Eugene P. Wigner Postdoctoral Fellow, Oak Ridge National Laboratory, 1978–1981.

### Invited Lectureships (selected list)

- Invited Speaker, SC14 International Conference for High Performance Computing, New Orleans, Louisiana, November 2014.
- Advanced Digital Sciences Center, Singapore, July 2011.
- Distinguished Lecturer, Penn State University, University Park, Pennsylvania, February 2008.
- DOE Scientific Discovery Through Advanced Computing (SciDAC) Conference, Boston, Massachusetts, June 2007.
- Harvard University, Cambridge, Massachusetts, September 2006.
- Cray Distinguished Lecturer, University of Minnesota, Minneapolis, Minnesota, November 2005.
- Distinguished Lecturer, University of Tennessee, Knoxville, Tennessee, October 2005.

- Distinguished Lecturer, Joint Institute for Computational Science, Oak Ridge National Laboratory, Oak Ridge, Tennessee, October 2005.
- Cornell University, Ithaca, New York, May 2005.
- Invited Speaker, Sixth International Meeting on High Performance Computing for Computational Science, Valencia, Spain, June 2004.
- Plenary Speaker, Eleventh SIAM Conference on Parallel Processing for Scientific Computing, San Francisco, California, February 2004.
- Keynote Speaker, DOE Computational Science Graduate Fellowship Conference, Washington, DC, 1999.
- Keynote Speaker, NSF Workshop on Model-Based Simulation, Arlington, Virginia, 1999.
- Distinguished Lecturer, University of Tennessee, Knoxville, Tennessee, 1999.
- Distinguished Lecturer, University of Minnesota Supercomputer Institute, Minneapolis, Minnesota, 1995.
- ICASE/LaRC Workshop on Parallel Numerical Algorithms, Hampton, Virginia, 1994.
- Workshop on Performance Measurement and Visualization of Parallel Systems, Moravany, Czechoslovakia, 1992.
- IBM Europe Institute, Oberlech, Austria, 1990.
- Danish Summer School in Supercomputing, Copenhagen, Denmark, 1989.
- Workshop on Vector and Parallel Computing, Umea, Sweden, 1988.
- International Conference on Vector and Parallel Computing, Loen, Norway, 1986.

## **Publications**

### **Books Authored**

1. Heath, M. T., *Scientific Computing: An Introductory Survey*, McGraw-Hill, New York, 1997.
2. Heath, M. T., *Scientific Computing: An Introductory Survey*, Second Edition, McGraw-Hill, New York, 2002.
3. Heath, M. T., *Scientific Computing: An Introductory Survey*, Revised Second Edition, SIAM, Philadelphia, PA, 2018.

### **Books Edited or Co-Edited**

1. Heath, M. T., editor, *Hypercube Multiprocessors 1986*, SIAM, Philadelphia, PA, 1986.
2. Heath, M. T., editor, *Hypercube Multiprocessors 1987*, SIAM, Philadelphia, PA, 1987.
3. Heath, M. T., V. Torczon, et al., editors, *Proc. Eighth SIAM Conf. on Parallel Processing for Scientific Computing*, SIAM, Philadelphia, PA, 1997.

4. Henderson, B., K. A. Yelick, et al., editors, Proc. Ninth SIAM Conf. on Parallel Processing for Scientific Computing, SIAM, Philadelphia, PA, 1999.
5. Heath, M. T., A. Ranade, and R. S. Schreiber, editors, *Algorithms for Parallel Processing*, Springer, New York, 1999.
6. Heath, M. T., and A. Lumsdaine, editors, *Proc. Eighth ACM SIGPLAN Symp. on Principles and Practice of Parallel Programming*, ACM Press, New York, 2001.

## Books Chapters

1. George, A., and M. T. Heath, "Solution of Sparse Linear Least Squares Problems Using Givens Rotations," in *Large Scale Matrix Problems*, ed. by Å. Björck, R. J. Plemmons and H. Schneider, Elsevier North Holland, 1981, pp. 69–83.
2. Geist, G. A., M. T. Heath, and E. Ng, "Parallel Algorithms for Matrix Computations," in *The Characteristics of Parallel Algorithms*, ed. by R. Douglass, D. Gannon, and L. Jamieson, MIT Press, Cambridge, 1987, pp. 233–251.
3. Heath, M. T., "Parallel Computing: Perspectives and Prospects," in *Opportunities and Constraints of Parallel Computing*, ed. by J. L. C. Sanz, Springer, New York, 1989, pp. 63–66.
4. George, A., M. T. Heath, J. Liu, and E. Ng, "Solution of Sparse Positive Definite Systems on a Hypercube," in *Parallel Algorithms for Numerical Linear Algebra*, ed. by H. A. Van der Vorst and P. Van Dooren, North Holland, Amsterdam, 1990, pp. 129–156.
5. Heath, M. T., E. Ng, and B. W. Peyton, "Parallel Algorithms for Sparse Linear Systems," in *Parallel Algorithms for Matrix Computations*, SIAM, Philadelphia, PA, 1990, pp. 83–124.
6. Heath, M. T., "Visualization of Parallel and Distributed Systems," in *Parallel and Distributed Computing Handbook*, ed. by A. Y. Zomaya, McGraw-Hill, New York, 1996, pp. 897–916.
7. Heath, M. T., "Parallel Direct Methods for Sparse Linear Systems," in *Parallel Numerical Algorithms*, ed. by D. E. Keyes, A. Sameh, and V. Venkatakrisnan, Kluwer Academic Publishers, Boston, 1997, pp. 55–90.
8. Heath, M. T., A. D. Malony, and D. T. Rover, "Visualization for Parallel Performance Evaluation and Optimization," in *Software Visualization: Programming as a Multimedia Experience*, ed. by J. Stasko, J. Domingue, M. H. Brown, and B. A. Price, MIT Press, Cambridge, MA, 1998, pp. 347–365.
9. Heath, M. T., and P. Raghavan, "Performance of Parallel Sparse Triangular Solution," in *Algorithms for Parallel Processing*, ed. by M. T. Heath, A. Ranade, and R. S. Schreiber, Springer, New York, 1999, pp. 289–305.
10. Heath, M. T., and X. Jiao, "Parallel Methods and Software for Multicomponent Simulations," in *Parallel Processing for Scientific Computing*, ed. by M. A. Heroux, P. Raghavan and H. D. Simon, SIAM, Philadelphia, PA, 2006, pp. 341–355.
11. Golub, G. H., M. T. Heath, and G. Wahba, "Generalized Cross-Validation as a Method for Choosing a Good Ridge Parameter," in *Milestones in Matrix Computation*, ed. by R. H. Chan, C. Greif, and D. P. O’Leary, Oxford University Press, New York, 2007, pp. 202–212.

12. Heath, M. T., “Reordering for Parallelism,” in *Encyclopedia of Parallel Computing*, ed. by D. Padua, Springer, New York, 2011, pp. 1736-1741.
13. Jiang, P., J. Peng, M. Heath, and R. Yang, “A Clustering Approach to Constrained Binary Matrix Factorization,” in *Data Mining and Knowledge Discovery for Big Data*, ed. by W. Chu, Springer, New York, 2013, pp. 281-303.

## Monographs

1. Gallivan, K. A., M. T. Heath, E. Ng, J. M. Ortega, B. W. Peyton, R. J. Plemmons, C. H. Romine, A. H. Sameh, and R. G. Voigt, *Parallel Algorithms for Matrix Computations*, SIAM, Philadelphia, PA, 1990.

## Journal Articles

1. Haaland, C. M., and M. T. Heath, “Mapping of Population Density,” *Demography*, Vol. 11, No. 2 (May 1974), pp. 321–336.
2. Golub, G. H., M. T. Heath, and G. Wahba, “Generalized Cross-Validation as a Method for Choosing a Good Ridge Parameter,” *Technometrics*, Vol. 21, No. 2 (May 1979), pp. 215–223.
3. Chan, T. F., W. M. Coughran, E. H. Grosse, and M. T. Heath, “A Numerical Library and Its Support,” *ACM Trans. Math. Software*, Vol. 6, No. 2 (June 1980), pp. 135–145.
4. George, A., and M. T. Heath, “Solution of Sparse Linear Least Squares Problems Using Givens Rotations,” *Linear Algebra Appl.*, Vol. 34 (December 1980), pp. 69–83.
5. George, A., M. T. Heath, and R. J. Plemmons, “Solution of Large-Scale Sparse Least Squares Problems Using Auxiliary Storage,” *SIAM J. Sci. Stat. Comput.*, Vol. 2, No. 4 (December 1981), pp. 416–429.
6. Heath, M. T., “Some Extensions of an Algorithm for Sparse Linear Least Squares Problems,” *SIAM J. Sci. Stat. Comput.*, Vol. 3, No. 2 (June 1982), pp. 223–237.
7. George, A., M. T. Heath, and E. Ng, “A Comparison of Some Methods for Solving Sparse Linear Least Squares Problems,” *SIAM J. Sci. Stat. Comput.*, Vol. 4, No. 2 (June 1983), pp. 177–187.
8. Heath, M. T., “Numerical Methods for Large Sparse Linear Least Squares Problems,” *SIAM J. Sci. Stat. Comput.*, Vol. 5, No. 3 (September 1984), pp. 497–513.
9. Heath, M. T., R. J. Plemmons, and R. C. Ward, “Sparse Orthogonal Schemes for Structural Optimization Using the Force Method,” *SIAM J. Sci. Stat. Comput.*, Vol. 5, No. 3 (September 1984), pp. 514–532.
10. George, A., M. T. Heath, and E. Ng, “Solution of Sparse Underdetermined Systems of Linear Equations,” *SIAM J. Sci. Stat. Comput.*, Vol. 5, No. 4 (December 1984), pp. 988–997.
11. Grossman, G., and M. T. Heath, “Simultaneous Heat and Mass Transfer in Absorption of Gases in Turbulent Liquid Films,” *Intenat. J. Heat Mass Transfer*, Vol. 27, No. 12 (December 1984), pp. 2365–2376.

12. Berry, M. W., M. T. Heath, I. Kaneko, M. Lawo, R. J. Plemmons, and R. C. Ward, "An Algorithm to Compute a Sparse Basis of the Null Space," *Numer. Math.*, Vol. 47, No. 4 (December 1985), pp. 483–504.
13. George, A., M. T. Heath, and J. Liu, "Parallel Cholesky Factorization on a Shared-Memory Multiprocessor," *Linear Algebra Appl.*, Vol. 77 (May 1986), pp. 165–187.
14. Heath, M. T., and D. C. Sorensen, "A Pipelined Givens Method for Computing the QR Factorization of a Sparse Matrix," *Linear Algebra Appl.*, Vol. 77 (May 1986), pp. 189–203.
15. Scott, D. S., M. T. Heath, and R. C. Ward, "Parallel Block Jacobi Eigenvalue Algorithms Using Systolic Arrays," *Linear Algebra Appl.*, Vol. 77 (May 1986), pp. 345–355.
16. George, A., M. T. Heath, J. Liu, and E. Ng, "Solution of Sparse Positive Definite Systems on a Shared-Memory Multiprocessor," *Internat. J. Parallel Programming*, Vol. 15, No. 4 (August 1986), pp. 309–325.
17. Heath, M. T., A. J. Laub, C. C. Paige, and R. C. Ward, "Computing the Singular Value Decomposition of a Product of Two Matrices," *SIAM J. Sci. Stat. Comput.*, Vol. 7, No. 4 (October 1986), pp. 1147–1159.
18. Laub, A. J., M. T. Heath, C. C. Paige, and R. C. Ward, "Computation of System Balancing Transformations and Other Applications of Simultaneous Diagonalization Algorithms," *IEEE Trans. Automatic Control*, Vol. AC-32, No. 2 (February 1987), pp. 115–122.
19. Gilbert, J. R., and M. T. Heath, "Computing a Sparse Basis for the Null Space," *SIAM J. Alg. Disc. Meth.*, Vol. 8, No. 3 (July 1987), pp. 446–459.
20. George, A., M. T. Heath, J. Liu, and E. Ng, "Symbolic Cholesky Factorization on a Local-Memory Multiprocessor," *Parallel Computing*, Vol. 5, Nos. 1 & 2 (July 1987), pp. 85–95.
21. George, A., M. T. Heath, J. Liu, and E. Ng, "Sparse Cholesky Factorization on a Local-Memory Multiprocessor," *SIAM J. Sci. Stat. Comput.*, Vol. 9, No. 2 (March 1988), pp. 327–340.
22. Heath, M. T., and C. H. Romine, "Parallel Solution of Triangular Systems on Distributed-Memory Multiprocessors," *SIAM J. Sci. Stat. Comput.*, Vol. 9, No. 3 (May 1988), pp. 558–588.
23. Eisenstat, S. C., M. T. Heath, C. S. Henkel, and C. H. Romine, "Modified Cyclic Algorithms for Solving Triangular Systems on Distributed-Memory Multiprocessors," *SIAM J. Sci. Stat. Comput.*, Vol. 9, No. 3 (May 1988), pp. 589–600.
24. George, A., M. T. Heath, J. Liu, and E. Ng, "Solution of Sparse Positive Definite Systems on a Hypercube," *J. Comp. Appl. Math.*, Vol. 27, Nos. 1 & 2 (September 1989), pp. 129–156.
25. Heath, M. T., G. A. Geist, and J. B. Drake, "Early Experience with the Intel iPSC/860 at Oak Ridge National Laboratory," *Internat. J. Supercomput. Appl.*, Vol. 5, No. 2 (Summer 1991), pp. 10–26.
26. Heath, M. T., E. Ng, and B. W. Peyton, "Parallel Algorithms for Sparse Linear Systems," *SIAM Review*, Vol. 33, No. 3 (September 1991), pp. 420–460.
27. Heath, M. T., and J. A. Etheridge, "Visualizing the Performance of Parallel Programs," *IEEE Software*, Vol. 8, No. 5 (September 1991), pp. 29–39.

28. Demmel, J. W., M. T. Heath, and H. A. van der Vorst, "Parallel Numerical Linear Algebra," *Acta Numerica*, Vol. 2, (1993), pp. 111–197.
29. Karp, A. H., M. Heath, D. Heller, and H. Simon, "1994 Gordon Bell Prize Winners," *IEEE Computer*, Vol. 28, No. 1 (January 1995), pp. 68–74.
30. Heath, M. T., and P. Raghavan, "A Cartesian Parallel Nested Dissection Algorithm," *SIAM J. Matrix Anal. Appl.*, Vol. 16, No. 1 (January 1995), pp. 235–253.
31. Heath, M. T., A. D. Malony, and D. T. Rover, "The Visual Display of Parallel Performance Data," *IEEE Computer*, Vol. 28, No. 11 (November 1995), pp. 21–28.
32. Heath, M. T., A. D. Malony, and D. T. Rover, "Parallel Performance Visualization: From Practice to Theory," *IEEE Parallel Distrib. Tech.*, Vol. 3, No. 4 (Winter 1995), pp. 44–60.
33. Karp, A. H., M. Heath, and A. Geist, "1995 Gordon Bell Prize Winners," *IEEE Computer*, Vol. 29, No. 1 (January 1996), pp. 79–85.
34. Heath, M. T., and P. Raghavan, "Performance of a Fully Parallel Sparse Solver," *Internat. J. Supercomput. Appl. High Perf. Comput.*, Vol. 11, No. 1, (Spring 1997), pp. 49–64.
35. Nasir, M. A., W. C. Chew, P. Raghavan, and M. T. Heath, "A Comparison of Computational Complexities of HFEM and ABC Based Finite Element Methods," *J. Electromagnetic Waves Appl.*, Vol. 11, (1997), pp. 1601–1617.
36. Heath, M. T. and W. A. Dick, "Virtual Rocketry: Rocket Science Meets Computer Science," *IEEE Comput. Sci. Engr.*, Vol. 5, No. 1 (January-March 1998), pp. 16–26.
37. Heath, M. T. and W. A. Dick, "Virtual Prototyping of Solid Propellant Rockets," *Comput. Sci. Engr.*, Vol. 2, No. 2 (March-April 2000), pp. 21–32.
38. Jiao, X., and M. T. Heath, "Overlaying Surface Meshes, Part I: Algorithms," *Internat. J. Comput. Geom. Appl.*, Vol. 14, No. 6 (December 2004), pp. 379-402.
39. Jiao, X., and M. T. Heath, "Overlaying Surface Meshes, Part II: Topology Preservation and Feature Matching," *Internat. J. Comput. Geom. Appl.*, Vol. 14, No. 6 (December 2004), pp. 403-419.
40. Jiao, X., and M. T. Heath, "Common-Refinement-Based Data Transfer between Non-matching Meshes in Multiphysics Simulations," *Internat. J. Numer. Meth. Engrg.*, Vol. 61, No. 14 (December 2004), pp. 2402-2427.
41. Lopez, V., P. Boyland, M. T. Heath, and R. D. Moser, "Relative Periodic Solutions of the Complex Ginzburg-Landau Equation," *SIAM J. Appl. Dynamical Systems*, Vol. 4, No. 4 (2005), pp. 1042-1075.
42. Sahinidis, N. V., M. T. Harandi, M. T. Heath, L. Murphy, M. Snir, R. P. Wheeler, and C. F. Zukoski, "Establishing a Master's Degree Programme in Bioinformatics: Challenges and Opportunities," *IEE Proc. Syst. Biol.*, Vol. 152, No. 4 (December 2005), pp. 269-275.
43. Jiao, X., G. Zheng, P. A. Alexander, M. T. Campbell, O. S. Lawlor, J. Norris, A. Haselbacher, and M. T. Heath, "A System Integration Framework for Coupled Multiphysics Simulations," *Engineering with Computers*, Vol. 22, No. 3-4 (December 2006), pp. 293-309.

44. Gates, M. R., K. Matous, and M. T. Heath, "Asynchronous Multi-Domain Variational Integrators for Non-Linear Problems," *Internat. J. Numer. Meth. Engrg.*, Vol. 76, (June 2008), pp. 1353-1378.
45. Wolf, M. M., and M. T. Heath, "Combinatorial Optimization of Matrix-Vector Multiplication in Finite Element Assembly," *SIAM J. Sci. Comput.*, Vol. 31, No. 4 (July 2009), pp. 2960-2980.
46. Avetisyan, A. I., R. Campbell, I. Gupta, M. T. Heath, et al., "Open Cirrus: A Global Cloud Computing Testbed," *IEEE Computer*, Vol. 43, No. 4 (April 2010), pp. 35-43.
47. Hewett, R. J., M. T. Heath, M. D. Butala, and F. Kamalabadi, "A Robust Null Space Method for Linear Equality Constrained State Estimation," *IEEE Trans. Signal Proc.*, Vol. 58, No. 8 (August 2010), pp. 3961-3971.
48. Gates, M., J. Lambros, and M. T. Heath, "Towards High Performance Digital Volume Correlation," *Experimental Mechanics*, Vol. 51, No. 4 (2011), pp. 491-507.
49. Reichert, A., M. T. Heath, and D. J. Bodony, "Energy Stable Numerical Methods for Hyperbolic Partial Differential Equations Using Overlapping Domain Decomposition," *J. Comput. Physics*, Vol. 231, (2012), pp. 5243-5265.
50. Michelotti, M. D, M. T. Heath, and M. West, "Binning for Efficient Stochastic Multiscale Particle Simulations," *Multiscale Modeling and Simulation*, Vol. 11, No. 4 (2013), pp. 1071-1096.
51. Totoni, E., M. T. Heath, and L. V. Kale, "Structure-Adaptive Parallel Solution of Sparse Triangular Linear Systems", *Parallel Computing*, Vol. 40, No. 9 (2014), pp. 454-470.
52. Gates, M., M. T. Heath, and J. Lambros, "High Performance Hybrid CPU and GPU Parallel Algorithm for Digital Volume Correlation," *Internat. J. High Performance Comput. Appl.*, Vol. 29, No. 1 (2015), pp. 92-106.
53. Gates, M., J. Gonzalez, M. T. Heath, and J. Lambros, "Subset Refinement for Digital Volume Correlation: Numerical and Experimental Applications," *Experimental Mechanics*, Vol. 55, No. 1 (2015), pp. 245-259.
54. Heath, M. T., "A Tale of Two Laws," *Internat. J. High Performance Comput. Appl.*, Vol. 29, No. 3 (2015), pp. 320-330.
55. Curtis, J. H, M. D. Michelotti, N. Riemer, M. T. Heath, and M. West, "Accelerated simulation of stochastic particle removal processes in particle-resolved aerosol models," *J. Comput. Physics*, Vol. 322 (2016), pp. 21-32.
56. Carrier, E., and M. T. Heath, "Exploiting compression in solving discretized linear systems," *Electron. Trans. Numer. Anal.*, 55 (2022), pp. 341-364.

## Conference Papers

1. George, A., G. H. Golub, M. T. Heath, and R. J. Plemmons, "Least Squares Adjustment of Large-Scale Geodetic Networks by Orthogonal Decomposition," Proc. Symp. on Geodetic Networks and Computations, Munich, Germany, 1981.



2. Berry, M. W., M. T. Heath, R. J. Plemmons, and R. C. Ward, "Orthogonal Schemes for Structural Optimization," *Trans. First Army Conf. Appl. Math. Comput.*, Army Research Office Rept. 84-1, February 1984, pp. 477–485.
3. Heath, M. T., "Sparse Matrix Computations," *Proc. 23rd IEEE Conf. on Decision and Control*, Las Vegas, Nevada, December 1984, pp. 662–665.
4. Heath, M. T., "The Hypercube: A Tutorial Overview," *Hypercube Multiprocessors 1986*, SIAM, Philadelphia, 1986, pp. 7–10.
5. Geist, G. A., and M. T. Heath, "Matrix Factorization on a Hypercube Multiprocessor," *Hypercube Multiprocessors 1986*, SIAM, Philadelphia, 1986, pp. 161–180.
6. Heath, M. T., "Hypercube Applications at Oak Ridge National Laboratory," *Hypercube Multiprocessors 1987*, SIAM, Philadelphia, 1987, pp. 395–417.
7. Henkel, C. S., M. T. Heath, and R. J. Plemmons, "Cholesky Downdating on a Hypercube," *Proc. Third Conf. Hypercube Concurrent Comput. Appl.*, ACM, New York, 1988, pp. 1592–1598.
8. George, A., M. T. Heath, J. Liu, and E. Ng, "Sparse Cholesky Factorization on a Local-Memory Multiprocessor," *Parallel Processing and Medium-Scale Multiprocessors*, SIAM, Philadelphia, 1989, pp. 58–75.
9. Geist, G. A., M. T. Heath, B. W. Peyton, and P. H. Worley, "A Machine-Independent Communication Library," *Proc. Fourth Conf. Hypercubes, Concurrent Comput. Appl.*, Golden Gate Enterprises, Los Altos, CA, 1990, pp. 565–568.
10. Heath, M. T., "Visual Animation of Parallel Algorithms for Matrix Computations," *Proc. Fifth Distributed Memory Comput. Conf.*, IEEE Computer Soc. Press, Los Alamitos, CA, 1990, pp. 1213–1222.
11. Worley, P. H., and M. T. Heath, "Performance Characterization Research at Oak Ridge National Laboratory," *Proc. Fourth SIAM Conf. Parallel Processing Sci. Comput.*, SIAM, Philadelphia, PA, 1990, pp. 431–436.
12. Heath, M. T., "Mathematical Software," *System Software and Tools for High Performance Computing Environments*, SIAM, Philadelphia, 1993, pp. 35–50.
13. Heath, M. T., "Recent Developments and Case Studies in Performance Visualization Using ParaGraph," *Performance Measurement and Visualization of Parallel Systems*, Elsevier Science Publishers, Amsterdam, 1993, pp. 175–200.
14. Heath, M. T., and P. Raghavan, "Distributed Solution of Sparse Symmetric Positive Definite Systems," *Proc. Scalable Parallel Libraries Conf.*, IEEE Computer Soc. Press, Los Alamitos, CA, 1994, pp. 114–122.
15. Heath, M. T., and P. Raghavan, "Performance of a Fully Parallel Sparse Solver," *Proc. Scalable High Performance Comput. Conf.*, IEEE Computer Soc. Press, Los Alamitos, CA, 1994, pp. 334–341.
16. Heath, M. T., "Performance Visualization with ParaGraph," *Proc. Second Workshop on Environments and Tools for Parallel Sci. Comput.*, SIAM, Philadelphia, 1994, pp. 221–230.

17. Nasir, M. A., W. C. Chew, P. Raghavan, and M. T. Heath, "O(1.5) Solution of Hybrid FEM Problems," Proc. IEEE Antennas and Propagation Soc. Internat. Symp., 1994, Vol. 1, pp. 447–450.
18. Jiao, X., H. Edelsbrunner, and M. T. Heath, "Mesh Association: Formulation and Algorithms," Proc. 8th International Meshing Roundtable, Lake Tahoe, CA, October 1999.
19. Pinar, A., and M. T. Heath, "Improving Performance of Sparse Matrix-Vector Multiplication," Proc. Supercomputing 99, Portland, OR, November 1999.
20. Heath, M. T., R. A. Fiedler, and W. A. Dick, "Simulating Solid Propellant Rockets at CSAR," AIAA 2000-3455, 36th AIAA/ASME/SAE/ASEE Joint Propulsion Conf., Huntsville, AL, July 2000.
21. Dick, W. A., R. A. Fiedler, and M. T. Heath, "Integrated Simulation of Solid Propellant Rockets," Second European Conference on Launcher Technology, Centre National d'Etudes Spatiales, Rome, Italy, November 2000.
22. Dick, W. A., M. T. Heath, and R. A. Fiedler, "Integrated 3-D Simulation of Solid Propellant Rockets," AIAA 2001-3949, 37th AIAA/ASME/SAE/ASEE Joint Propulsion Conf., Salt Lake City, UT, July 2001.
23. Jiao, X., and M. T. Heath, "Efficient and Robust Algorithm for Overlaying Surface Meshes," Proc. 10th International Meshing Roundtable, Newport Beach, CA, October 2001.
24. Jiao, X., and M. T. Heath, "Feature Detection for Surface Meshes," Proc. 8th Internat. Conf. on Numerical Grid Generation in Computational Field Simulation, Honolulu, HI, June 2002.
25. Dick, W. A., and M. T. Heath, "Whole System Simulation of Solid Propellant Rockets," AIAA 2002-4345, 38th AIAA/ASME/SAE/ASEE Joint Propulsion Conf., Indianapolis, IN, July 2002.
26. Lopez, V., P. Boyland, M. Heath, and R. Moser, "Relative Time-Periodic Solutions of the Complex Ginzburg-Landau Equation," SIAM Conf. Appl. Dynamical Systems, Snowbird, UT, May 2003.
27. Jiao, X., M. T. Campbell, and M. T. Heath, "Rocom: An Object-Oriented, Data Centric Software Integration Framework for Multiphysics Simulations," 17th Ann. ACM Internat. Conf. Supercomputing, San Francisco, CA, June 2003.
28. Jiao, X., and M. T. Heath, "Accurate, Conservative Data Transfer Between Nonmatching Meshes in Multiphysics Simulations," 7th U.S. National Congress on Computational Mechanics, Albuquerque, NM, July 2003.
29. Heath, M. T., and X. Jiao, "Parallel Computational Methods in Multicomponent Systems," Proc. 11th SIAM Conf. Parallel Processing for Scientific Computing, San Francisco, CA, February 2004.
30. Heath, M. T., and X. Jiao, "Parallel Simulation of Multicomponent Systems," VECPAR 2004: 6th Internat. Conf. on High Performance Computing for Computational Science, Valencia, Spain, June 2004, pp. 496–513.

31. Heath, M. T., and X. Jiao, "Academic Challenges in Coupling Large-Scale Multiphysics Simulations," Internat. Conf. Computational Science, Atlanta, Georgia, May 2005.
32. Dick, W. A., M. T. Heath, R. A. Fiedler, and M. D. Brandyberry, "Advanced Simulation of Solid Propellant Rockets from First Principles," AIAA 2005-3990, 41st AIAA/ASME/SAE/ASEE Joint Propulsion Conf., Tucson, AZ, July 2005.
33. Jiao, X., G. Zheng, O. S. Lawlor, P. J. Alexander, M. T. Campbell, M. T. Heath and R. A. Fiedler, "An Integration Framework for Simulations of Solid Rocket Motors," AIAA 2005-3991, 41st AIAA/ASME/SAE/ASEE Joint Propulsion Conf., Tucson, AZ, July 2005.
34. Dick, W. A., and M. T. Heath, "SP Rocket Simulations at CSAR," ISTS 2006-a-28, Proc. 25th International Symposium on Space Technology and Science, Kanazawa, Japan, June 2006.
35. Dick, W. A., R. A. Fiedler, and M. T. Heath, "High-fidelity Simulation of Solid Propellant Rockets," ISTS 2006-a-27, Proc. 25th International Symposium on Space Technology and Science, Kanazawa, Japan, June 2006.
36. Dick, W. A., and M. T. Heath, "Building *Rocstar*: Simulation Science for Solid Propellant Rocket Motors," AIAA 2006-4590, 42nd AIAA/ASME/SAE/ASEE Joint Propulsion Conf., Sacramento, CA, July 2006.
37. Hewett, R. J., I. H. Jermyn, M. T. Heath, and F. Kamalabadi, "A Phase Field Method for Tomographic Reconstruction from Limited Data," Proc. British Machine Vision Conf., pp. 120.1-120.11, Guildford, UK, August, 2012.
38. Jiang, P., and M. T. Heath, "Pattern Discovery in High Dimensional Binary Data," IEEE 13th Internat. Conf. Data Mining, pp. 474-481, Dallas, TX, December 2013.
39. Jiang, P., and M. T. Heath, "Mining Discrete Patterns via Binary Matrix Factorization," IEEE 13th Internat. Conf. Data Mining, pp. 1129-1136, Dallas, TX, December 2013.

#### **Technical Reports and Other Publications** (selected list)

1. Funderlic, R. E., and M. T. Heath, "Linear Compartmental Analysis of Ecosystems," Tech. Rept. ORNL-IBP-71-4, Oak Ridge National Laboratory, August 1971.
2. Haaland, C. M., and M. T. Heath, "Passive-Active Defense Studies for the Detroit Metropolitan Area," Tech. Rept. ORNL-4818, Oak Ridge National Laboratory, December 1972.
3. Heath, M. T., "The Numerical Solution of Ill-Conditioned Systems of Linear Equations," Tech. Rept. ORNL-4957, Oak Ridge National Laboratory, April 1974.
4. Chan, T. F., M. T. Heath, W. M. Coughran, and F. T. Luk, "Numerical Analysis Program Library User's Guide," User Note 82, Stanford Linear Accelerator Center Computing Services, Stanford Center for Information Processing, October 1975.
5. Heath, M. T., "Numerical Algorithms for Nonlinearly Constrained Optimization," Tech. Rept. STAN-CS-78-656, Dept. of Computer Science, Stanford University, April 1978.
6. Heath, M. T., editor, "Sparse Matrix Software Catalog," Oak Ridge National Laboratory, October 1982.

7. Heath, M. T., "Parallel Cholesky Factorization in Message-Passing Multiprocessor Environments," Tech. Rept. ORNL-6150, Oak Ridge National Laboratory, May 1985.
8. Geist, G. A., and M. T. Heath, "Parallel Cholesky Factorization on a Hypercube Multiprocessor," Tech. Rept. ORNL-6190, Oak Ridge National Laboratory, August 1985.
9. Heath, M. T., "Parallel Computing at ORNL," *Oak Ridge National Laboratory Review*, Vol. 18, No. 4 (1985), pp. 1-7.
10. Heath, M. T., "Supercomputer Research and Development Requirements for Army Sponsored Independent Research Center," white paper prepared for U.S. Army Research Office, 1987.
11. Bailey, D., E. Brooks, J. Dongarra, A. Hayes, M. Heath, and G. Lyon, "Benchmarks to Supplant Export FPDR Calculations," Tech. Rept. NBSIR 88-3795, Institute for Computer Sciences and Technology, National Bureau of Standards, Gaithersburg, MD, June 1988.
12. Heath, M. T., and C. H. Romine, "A Consumer's Guide to Advanced Computer Architectures," white paper prepared for U.S. Army Research Office, 1989.
13. Geist, G. A., M. T. Heath, B. W. Peyton, and P. H. Worley, "PICL: A Portable Instrumented Communication Library, C Reference Manual," ORNL/TM-11130, Oak Ridge National Laboratory, July 1990.
14. Geist, G. A., M. T. Heath, B. W. Peyton, and P. H. Worley, "A Users' Guide to PICL: A Portable Instrumented Communication Library," ORNL/TM-11616, Oak Ridge National Laboratory, September 1990.
15. Ostrouchov, L. S., M. T. Heath, and C. H. Romine, "Modeling Speedup in Parallel Sparse Matrix Factorization," ORNL/TM-11786, Oak Ridge National Laboratory, March 1991.
16. Heath, M. T., and J. A. Etheridge, "Visualizing Performance of Parallel Programs," ORNL/TM-11813, Oak Ridge National Laboratory, May 1991.
17. Heath, M. T., and P. Raghavan, "Distributed Solution of Sparse Linear Systems," UIUC-DCS-1793, Dept. of Computer Science, University of Illinois at Urbana-Champaign, February 1993.
18. Sterling, T., P. Messina, M. T. Heath, et al., "System Software and Tools for High Performance Computing Environments," Publication 93-15, Jet Propulsion Laboratory, Pasadena, California, April 1993.
19. Hovland, P., and M. T. Heath, "Adaptive SOR: A Case Study in Automatic Differentiation of Algorithm Parameters," Preprint ANL/MCS-P673-0797, Mathematics and Computer Science Division, Argonne National Laboratory, Argonne, Illinois, July 1997.
20. Heath, M. T., "Whole-System Simulation of Solid Rockets Is Goal of ASCI Center at Illinois," *SIAM News*, Vol. 31, No. 4 (May 1998), pp. 1, 8.
21. Cochran, W. K., M. T. Heath, and K. W. McKioui, "A Family of Hybrid Random Number Generators with Adjustable Quality and Speed," arXiv 1307.4320, 2013.

## Grants and Contracts Awarded

### For Research

Years	Title	Agency	PI/Co-PI	Amount
1991–1998	Scalable Parallel Libraries	DARPA	PI	\$950,000
1997–2002	Center for Simulation of Advanced Rockets	DOE	PI	\$20,250,000
1998–2001	Utilization of Advanced Intel-Based Platforms	Intel	PI	\$3,900,000
1998–2001	Simulation and Optimization of Casting and Extrusion Processes	NSF/ DARPA	Co-PI	\$2,100,000
1998–2001	Integrated Computational Environment for Studying Ion Movement in Biological Systems	NSF	Co-PI	\$1,100,000
2002–2010	Center for Simulation of Advanced Rockets	DOE	PI	\$26,250,000
2003–2006	Robust Lagrangian Surface Propagation with Topological Control	NSF	Co-PI	\$400,000
2006–2008	Meshing Collaboration	Boeing	PI	\$126,477
2006–2008	Massive Parallelization of xFD	Caterpillar	PI	\$190,000
2008–2010	Cloud Computing Testbed	NSF/Yahoo/Intel	PI	\$560,000
2010–2012	Towards Green Data Centers	NSF	Co-PI	\$293,893

### For Instruction

Years	Title	Agency	PI/Co-PI	Amount
2000–2002	Interactive Modules in Computational Science	NSF/NCSA	PI	\$60,000

## Graduate Thesis Research Advising

Year	Ph.D. Student	Employment
1996	Henry Neeman	University of Oklahoma
1997	Jason Hibbeler	University of Vermont
1997	Paul Hovland	Argonne National Laboratory
1999	Akhil Vidwans	Google, Seattle
2000	Boyana Norris	University of Oregon
2001	Ali Pinar	Sandia National Laboratories, Livermore
2001	Xiangmin Jiao	SUNY Stony Brook
2004	Vanessa Lopez	Brookhaven National Laboratory
2005	Rebecca Hartman-Baker	NERSC, Lawrence Berkeley National Laboratory
2007	Hanna Neradt	Keiser University
2009	Michael Wolf	Sandia National Laboratories, Albuquerque
2009	William Cochran	Two Sigma Investments, New York
2011	Mark Gates	University of Tennessee, Knoxville
2011	Adam Reichert	Facebook, Seattle
2011	Russell Hewett	Virginia Tech
2013	Peng Jiang	Momentive.ai
2013	Dmitry Yershov	Motional, Boston
2014	Elena Caraba	Department of Defense, South Carolina
2019	Erin Carrier	Grand Valley State University
2020	Nathan Bowman	Grand Valley State University

Year	M.S. Student	Employment
1990	Susan Blackford	Myricom, Inc.
1994	Robert Gjertsen	IBM Austin, TX
1995	Paulo Figueiredo	Petrobras, Rio de Janeiro
1995	Robert Block	Linkedin
1996	Minghorng Lai	
1996	Jesus Izaguirre	Silicon Therapeutics
2007	Mark Gates	University of Tennessee, Knoxville
2012	Matthew Michelotti	HERE, a Nokia Company

## Postdoctoral Associate Mentoring

- Dr. Elizabeth Jessup, USA, 1989-1991, now Professor, Dept. Computer Science, University of Colorado.
- Dr. Padma Raghavan, India, 1991-1994, now Vice Provost for Research, Vanderbilt University.
- Dr. Alla Sheffer, Israel, 1999-2001, now Professor, Dept. Computer Science, University of British Columbia.
- Dr. Damrong Guoy, Thailand, 2001-2004, now with Toyota Research Institute, Los Altos, CA
- Dr. Xiangmin Jiao, China, 2001-2004, now Associate Professor, Dept. Applied Mathematics and Statistics, State University of New York at Stony Brook.

- Dr. Vanessa Lopez, Puerto Rico, 2004, now Research Staff Member, Brookhaven National Laboratory.
- Dr. Eric Shaffer, USA, 2005–2007, now Teaching Associate Professor, Dept. Computer Science, University of Illinois at Urbana-Champaign.

### **Editorships of Journals**

- Editorial Board, SIAM News, 1988–2012.
- Editorial Board, SIAM Journal on Scientific Computing, 1990–1995.
- Editorial Board, International Journal of High Performance Computing Applications, 1993–2019.
- Editorial Board, SIAM Review, 1994–2002.
- Editorial Board, SIAM Fundamentals of Algorithms, 2003–2010.

### **Conference Committee Memberships**

- Sparse Matrix Symposium, Fairfield Glade, Tennessee, 1982.
- Conference on Hypercube Multiprocessors (Chair), Knoxville, Tennessee, 1985.
- Conference on Hypercube Multiprocessors (Chair), Knoxville, Tennessee, 1986.
- Hypercube Concurrent Computers and Applications, Pasadena, California, 1988.
- Hypercube Concurrent Computers and Applications, Monterey, California, 1989.
- Distributed-Memory Computing Conference, Charleston, South Carolina, 1990.
- International Conference on Supercomputing, Amsterdam, Netherlands, 1990.
- Distributed-Memory Computing Conference, Portland, Oregon, 1991.
- International Conference on Supercomputing, Cologne, Germany, 1991.
- Scalable High Performance Computing Conference, Williamsburg, Virginia, 1992.
- HPCC Grand Challenge Applications Workshop, Pittsburgh, Pennsylvania, 1993.
- Supercomputing 94, Washington DC, 1994.
- Fifth Symposium on Frontiers of Massively Parallel Computation (Co-chair for algorithms), McLean, Virginia, 1995.
- International Parallel Processing Symposium, Santa Barbara, California, 1995.
- IMA Workshop on Algorithms for Parallel Processing (Co-chair), Minneapolis, Minnesota, 1996.
- Eighth SIAM Conference on Parallel Processing for Scientific Computing (Co-chair), Minneapolis, Minnesota, 1997.

- Sixth ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming, Las Vegas, Nevada, 1997.
- Seventh IEEE Symposium on Frontiers of Massively Parallel Computation, Annapolis, Maryland, 1999.
- Ninth SIAM Conference on Parallel Processing for Scientific Computing, San Antonio, Texas, 1999.
- SIAM Conference on Computational Science and Engineering, Washington, DC, 2000.
- Tenth SIAM Conference on Parallel Processing for Scientific Computing, Norfolk, Virginia, 2001.
- Eighth ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (General Chair), Snowbird, Utah, 2001.
- SIAM Workshop on Computational Sciences & Engineering, Mathematics, and Computer Sciences, Arlington, Virginia, 2003.
- SIAM Conference on Parallel Processing for Scientific Computing, San Francisco, California, 2006.
- VECPAR 2006: 7th International Meeting on High Performance Computing for Computational Science, Rio de Janeiro, Brazil, 2006.
- International Conference on Parallel Processing, San Diego, 2010.

## Service

### Professional Society

- Board of Directors, ACM Special Interest Group on Numerical Mathematics (SIGNUM), 1985–1993 (Vice-Chair, 1989–1993).
- Vice-Chair, SIAM Activity Group on Linear Algebra, 1989–1992.
- Vice-Chair, SIAM Activity Group on Supercomputing, 1994–1996.
- Chair, SIAM Activity Group on Supercomputing, 1997–1999.
- Member, SIAM Council, 2004–2009.

### Federal

- Selection Panel, NSF Science and Technology Centers program, 1988.
- Selection Panel, NSF Young Investigator awards, 1991, 1994.
- Review Committee for DOE High Performance Computing activities at Fermi National Accelerator Laboratory, 1991.
- Working Group Chair, NASA Workshop on Software for Parallel Systems, 1992.



- Advisory Committee, DOE High Performance Computing Research Centers at Los Alamos National Laboratory and Oak Ridge National Laboratory, 1992–1996.
- Scientific Review Committee, Mathematics and Computer Science Division, Argonne National Laboratory, 1992–1998, Chair, 1998.
- Panel of Judges, Gordon Bell Prizes in High Performance Computing, 1994–95.
- Committee of Visitors, NSF Division of Computer and Computation Research, 1996.
- Review Panel, Advanced Computational Testing and Simulation Program, U.S. Department of Energy, 1999.
- Participant in Congressional Science Day, Washington DC, 2000.
- Computation Directorate Review Committee, Lawrence Livermore National Laboratory, 2003–2004.
- Chair, Director’s Review Committee for Computing Sciences, Lawrence Berkeley National Laboratory, 2005.
- Advisory Board, NIH Center for Macromolecular Modeling and Bioinformatics, 2006–2012.
- Advisory Committee Balance Panel, Advanced Scientific Computing Research, U.S. Department of Energy, 2007–2008.
- Committee of Visitors, Applied Mathematics Research Program, U.S. Department of Energy, 2010.
- Selection Panel, INCITE Awards Program, U.S. Department of Energy, 2011-2013.
- Chair, Scientific Advisory Committee, Computing and Computational Sciences Directorate, Oak Ridge National Laboratory, 2012-2013.
- Independent Design Review Team, Exascale Computing Project, U.S. Department of Energy, 2016.