

Timothy Alden Davis

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• Education:

- **Ph.D., 1989.** Electrical Engineering, University of Illinois, Urbana-Champaign, Illinois.
Four-year graduate research fellowship from the American Electronics Association, 1985-1989.
Dissertation: *A Parallel Algorithm for Sparse Unsymmetric LU Factorization*.
Advisor: Pen-Chung Yew.
- **M.S., 1987.** Electrical Engineering, University of Illinois, Urbana-Champaign, Illinois.
Thesis: *PSolve: a Concurrent Algorithm for Solving Sparse Systems of Linear Equations*.
Advisor: Edward S. Davidson.
- **B.S., With Distinction, 1983.** Electrical Engineering, Purdue University, West Lafayette, Indiana.

• Employment:

- **Professor.** Computer Science and Engineering, Texas A&M University, June 2014 to date.
- **Professor.** Computer and Information Science and Engineering, University of Florida, 2007 to 2014.
- **Visiting Associate Professor.** Computer Science, Stanford University, 2002-2003.
- **Visiting Staff Member.** Scientific Computing Group, Computational Research Division, Lawrence Berkeley National Laboratory, 2002-2003.
- **Associate Professor.** Computer and Information Science and Engineering, University of Florida, 1996-2007.
- **Assistant Professor.** Computer and Information Science and Engineering, University of Florida, 1991-1996.
- **Post-doctoral Researcher.** Parallel Algorithms Team, European Center for Research and Advanced Training in Scientific Computation (CERFACS), Toulouse, France, 1989-1990. Advisor: Iain Duff.

• Honors and Awards:

- 2018 Walston Chubb Award for Innovation, by Sigma Xi. Citation: *For his theoretical and experimental innovations leading to the creation of new algorithms and widely-used software for solving large sparse matrix problems that arise in a vast range of real-world applications.*
- TEES Faculty Fellow Award, College of Engineering, Texas A&M, May 2018.
- Dean of Engineering Excellence Award, College of Engineering, Texas A&M (\$5,000), May 2017.
- Fellow of Institute for Electrical and Electronics Engineers (IEEE), 2016. *"For contributions to sparse matrix algorithms and software."*
- Fellow of the Association for Computing Machinery (ACM), 2014: *"For contributions to sparse matrix algorithms and software."*
- Fellow of the Society of Industrial and Applied Mathematics, Class of 2013: *"For contributions to sparse matrix algorithms and software, including the University of Florida Sparse Matrix Collection."*
- Principal Investigator of the Texas A&M CUDA Research Center, named by NVIDIA, June 2014.
- IEEE Senior Member, Feb 19, 2015
- University of Florida Inventor Award, 2012 and 2013.
- Google Open Source Software Award, 2012.
- NVIDIA Academic Partner, 2011 to date.
- Teacher of the Year, University of Florida, Dept of Computer and Information Science and Engineering, 1997-1998.
- Faculty Member of the Year, University of Florida, Dept of Computer and Information Science and Engineering, 1991-1992.
- Four-year graduate research fellowship from the American Electronics Association, 1985-1989.

• Professional Memberships/Activities:

- GrAPL 2019 Program Committee (Workshop on Graphs, Architectures, Programming, and Learning).

- Editorial Board Member, SIAM Book Series on the Fundamentals of Algorithms, 2013 to date.
 - Editorial Board Member, SIAM Book Series on Software, Environments, and Tools, 2014 to date.
 - Associate Editor of J. Parallel and Distributed Computing, 2015 to date.
 - Associate Editor of SIAM Journal on Scientific Computing, 2012 to date.
 - Associate Editor of ACM Transactions on Mathematical Software, 2008 to date.
 - Associate Editor of Computational Optimization and Applications, 2005 to 2012.
 - SIAM Council, 2007 to 2015.
 - SIAM Council Representative to the SIAM Board of Trustees, 2010 to 2015.
 - SIAM Industry Committee, 2012 to 2015.
 - Associate Editor of IEEE Transactions on Parallel and Distributed Systems, 2005-2009.
 - Board of Directors, ACM Special Interest Group on Numerical Mathematics, 1998-2000.
 - Member of the Society for Industrial and Applied Mathematics (SIAM), 1992 to date.
 - Member of the Association for Computing Machinery (ACM), 1989 to date.
 - Member of the IEEE.
 - Member of the IEEE Computer Society.
- **Books:**
 1. T. A. Davis, *Direct Methods for Sparse Linear Systems*, SIAM Series on the Fundamentals of Algorithms, SIAM, Philadelphia, PA, 2006.
 2. T. A. Davis, *MATLAB Primer*, 8th Edition, CRC Press, 2010. (7th Edition in 2005, 6th in 2001).
 - **Journal Publications:**
 1. T. Davis, *Algorithm 9xx: SuiteSparse:GraphBLAS: graph algorithms in the language of sparse linear algebra*, ACM Trans on Mathematical Software, to appear, 2019.
 2. T. A. Davis, W. W. Hager, S. P. Kolodziej, and S. N. Yeralan, *Algorithm XXX: Mongoose, A Graph Coarsening and Partitioning Library*, submitted to ACM Trans on Mathematical Software, April 2018.
 3. M. Tang, M. Gadou, S. Rennich, T. A. Davis, S. Ranka, *Optimized sparse Cholesky factorization on hybrid multicore architectures*, Journal of Computational Science, Volume 26, 2018, Pages 246-253, ISSN 1877-7503, <https://doi.org/10.1016/j.jocs.2018.04.008>.
 4. P. Herholz, T. Davis, M. Alexa, *Localized solutions of sparse linear systems for geometry processing*, ACM Transactions on Graphics, Vol. 36, No. 6, Article 183. November 2017. <https://doi.org/10.1145/3130800.3130849>
 5. S. N. Yeralan, T. A. Davis, S. Ranka, *Algorithm 980: Sparse QR factorization on GPU architectures*, vol 44, no 17, ACM Trans. on Mathematical Software, 2017, <https://doi.org/10.1145/3065870>.
 6. T. Davis, S. Rajamanickam, and W. Sid-Lakhdar, *A Survey of Direct Methods for Sparse Linear Systems*, Acta Numerica, 2016, vol 25, pp 383-566. Invited.
 7. *Accelerating Sparse Cholesky Factorization on GPUs*, S. Rennich, D. Stosic, and T. A. Davis, Parallel Computing, posted online (<http://dx.doi.org/10.1016/j.parco.2016.06.004>).
 8. B. S. Cannataro, A. V. Rao, and T. A. Davis, *State-defect constraint pairing graph coarsening method for KarushKuhnTucker matrices arising in orthogonal collocation methods for optimal control*, Computational Optimization and Applications, July 2016, Volume 64, Issue 3, pp 793-819.
 9. P. Bogiatzis, M. Ishii, and T. A. Davis, *Toward using direct methods in seismic tomography: computation of the full resolution matrix using high performance computing and sparse QR factorization*, 205 (2), 830-836, 2016.
 10. T. A. Davis, W. W. Hager, J. T. Hungerford, *An Efficient Hybrid Algorithm for the Separable Convex Quadratic Knapsack Problem*, ACM Trans. on Math. Softw. 42(3), June 2016.
 11. L. V. Foster, T. A. Davis, *Algorithm 933: Reliable calculation of numerical rank, null space bases, pseudo-inverse solutions, and basic solutions using SuiteSparseQR*, ACM Trans. on Mathematical Software, 40(1), 2013, pp. 7:1-7:23.
 12. T. A. Davis, *Algorithm 930: FACTORIZE, an object-oriented linear system solver for MATLAB*, ACM Trans. on Mathematical Software, 39(4), 2013, pp. 28:1-28:18.
 13. M. Pais, S. Yeralan, T. A. Davis, and N. H. Kim, *An exact reanalysis algorithm using incremental Cholesky factorization and its application to crack growth modelling*, Intl. J. for Numerical Methods in Engineering, 91(12), 2012, pp. 1358–1364.
 14. T. A. Davis, Y. Hu, *The University of Florida Sparse Matrix Collection*, ACM Trans. on Mathematical Software, 38(1), 2011, pp. 1–25.

15. T. A. Davis, *Algorithm 915: SuiteSparseQR: Multifrontal multithreaded rank-revealing sparse QR factorization*, ACM Trans. on Mathematical Software, 38(1), 2011, pp. 8:1–8:22.
16. T. A. Davis, Y. Hu, *Sparse Matrices*, The Harvard Advocate, Winter 2011, pp. 42–44.
17. L. Grigori, E. Boman, S. Donfack, and T. A. Davis, *Hypergraph-based unsymmetric nested dissection ordering for sparse LU factorization*, SIAM J. Scientific Computing, 32(6), 2010, pp. 3426–3446.
18. T. A. Davis and E. Palamadai Natarajan, *Algorithm 907: KLU, a direct sparse solver for circuit simulation problems*, ACM Trans. on Mathematical Software, 37(3), 2010, pp. 36:1–36:17.
19. T. A. Davis and W. W. Hager, *Dynamic supernodes in sparse Cholesky update/downdate and triangular solves*, ACM Trans. on Mathematical Software, 35(4), 2009, pp. 27:1–27:23.
20. Y. Chen, T. A. Davis, W. W. Hager, and S. Rajamanickam, *Algorithm 887: CHOLMOD, supernodal sparse Cholesky factorization and update/downdate*, ACM Trans. on Mathematical Software, 35(3), 2008, pp. 22:1–22:14.
21. T. A. Davis and W. W. Hager, *A sparse proximal implementation of the LP Dual Active Set Algorithm*, Mathematical Programming, 112(2), 2008, pp. 275–301.
22. T. A. Davis and W. W. Hager, *Dual multilevel optimization*, Mathematical Programming, 112(2), 2008, pp. 403–425.
23. T. A. Davis, *Algorithm 849: A concise sparse Cholesky factorization package*, ACM Trans. on Mathematical Software, 31(4), 2005, pp. 587–591.
24. P. Fishwick, T. A. Davis, and J. Douglas, *Model representation with aesthetic computing: Method and empirical study*, ACM Trans. on Modeling and Computer Simulation, 15(3), 2005, pp. 254–279.
25. T. A. Davis and W. W. Hager, *Row modification techniques for sparse Cholesky factorization*, SIAM J. Matrix Analysis and Applications, 26(3), 2005, pp. 621–639.
26. P. Amestoy, T. A. Davis, and I. S. Duff, *Algorithm 837: An approximate minimum degree ordering algorithm*, ACM Trans. on Mathematical Software, 30(3), 2004, pp. 381–388.
27. T. A. Davis, J. R. Gilbert, S. Larimore, E. Ng, *Algorithm 836: COLAMD, an approximate column minimum degree ordering algorithm*, ACM Trans. on Mathematical Software, 30(3), 2004, pp. 377–380.
28. T. A. Davis, J. R. Gilbert, S. Larimore, E. Ng, *An approximate column minimum degree ordering algorithm*, ACM Trans. on Mathematical Software, 30(3), 2004, pp. 353–376.
29. T. A. Davis, *Algorithm 832: UMFPACK - an unsymmetric-pattern multifrontal method with a column pre-ordering strategy*, ACM Trans. on Mathematical Software, 30(2), 2004, pp. 196–199.
30. T. A. Davis, *A column pre-ordering strategy for the unsymmetric-pattern multifrontal method*, ACM Trans. on Mathematical Software, 30(2), 2004, pp. 165–195.
31. T. A. Davis and W. W. Hager, *Multiple-rank modifications of a sparse Cholesky factorization*, SIAM J. Matrix Analysis and Applications, 22(4), 2001, pp. 997–1013.
32. T. A. Davis and W. W. Hager, *Modifying a sparse Cholesky factorization*, SIAM J. Matrix Analysis and Computations, 20(3), 1999, pp. 606–627.
33. T. A. Davis and I. S. Duff, *A combined unifrontal/multifrontal method for unsymmetric sparse matrices*, ACM Trans. on Mathematical Software, 25(1), 1999, pp. 1–19.
34. T. A. Davis and I. S. Duff, *An unsymmetric-pattern multifrontal method for sparse LU factorization*, SIAM J. Matrix Analysis and Computations, 18(1), 1997, pp. 140–158.
35. P. Amestoy, T. A. Davis, and I. S. Duff, *An approximate minimum degree ordering algorithm*, SIAM J. Matrix Analysis and Applications, 17(4), 1996, pp. 886–905.
36. T. Johnson, T. A. Davis, and S. M. Hadfield, *A concurrent dynamic task graph*, Parallel Computing, 22(2), 1996, pp. 327–333.
37. S. E. Zitney, J. Mallya, T. A. Davis, and M. A. Stadtherr, *Multifrontal vs. frontal techniques for chemical process simulation on supercomputers*, J. Computers and Chemical Engineering, 20(6/7), 1996, pp. 641–646.
38. S. M. Hadfield and T. A. Davis, *The use of graph theory in a parallel multifrontal method for sequences of unsymmetric pattern sparse matrices*, Congressus Numerantium, 108(1), 1995, pp. 43–52.
39. T. Johnson and T. A. Davis, *Parallel buddy memory management*, Parallel Processing Letters, 2(4), 1992, pp. 391–398.
40. T. A. Davis and P.-C. Yew, *A nondeterministic parallel algorithm for general unsymmetric sparse LU factorization*, SIAM J. Matrix Analysis and Applications, 11(3), 1990, pp. 383–402.
41. T. A. Davis and E. S. Davidson, *Pairwise reduction for the direct, parallel solution of sparse unsymmetric sets of linear equations*, IEEE Trans. on Computers, 37(12), 1988, pp. 1648–1654.

- **Book Chapters:**

1. T. A. Davis, *Searching a Graph (VI.10)*, Princeton Companion to Applied Mathematics, Ed. N. Higham et al., Princeton Univ. Press, 2015.
2. T. A. Davis and Y. Hu, *Graph Theory (II.16)*, Princeton Companion to Applied Mathematics, Ed. N. Higham et al., Princeton Univ. Press, 2015.
3. W. W. Hager, S. C. Park, and T. A. Davis, *Block exchange in graph partitioning*, In *Approximation and Complexity in Numerical Optimization: Continuous and Discrete Problems*, P. M. Pardalos, Editor, Kluwer Academic Publishers, 2000, pp. 299–307.

- **Copyrighted Software:**

1. SuiteSparse:GraphBLAS: graph algorithms in the language of linear algebra, 2017-2018. Appears in Debian and Ubuntu Linux distros and listed as the sole implementation at <http://graphblas.org>. Submitted to ACM TOMS.
2. Mongoose: graph partitioning library. With W. Hager, Nuri Yeralan, and Scott Kolodziej. Submitted to ACM TOMS.
3. SuiteSparseQR+GPU: sparse QR factorization on the GPU, 2014. Appears in SuiteSparse 4.4.0 and ACM Algorithm 980.
4. CHOLMOD+GPU: sparse Cholesky on the GPU, 2014. Collaboration with NVIDIA. Appears in SuiteSparse 4.3.0. ACM Algorithm 9xx in preparation. See also <https://developer.nvidia.com/cholmod>
5. NAPHEAP: ACM Algorithm 9xx, submitted.
6. SPQR_RANK: ACM Algorithm 933, 2013.
7. FACTORIZE: ACM Algorithm 930, 2013. Also appears in MATLAB Central, Pick of the Week.
8. SuiteSparseQR: ACM Algorithm 915 (appears as `qr` and `x=A\b` in MATLAB), 2011.
9. KLU: ACM Algorithm 907, (appears in Xyce by Sandia National Labs, Berkeley Design Automation, SIMetrix), 2010.
10. CHOLMOD: ACM Algorithm 887, (appears as `chol` and `x=A\b` in MATLAB, Google Ceres, and many commercial packages), 2008.
11. SFMULT, and SSMULT (appears as `A*B` in MATLAB when `A` or `B` are sparse), 2008.
12. CSparse, (appears as `dmpem` in MATLAB), 2006.
13. LDL: ACM Algorithm 849, (appears in a commercial circuit simulator by IBM), 2005.
14. AMD: ACM Algorithm 837, (appears as `amd` and `x=A\b` in MATLAB), 2004.
15. UMFPACK: ACM Algorithm 832, (appears as `lu` and `x=A\b` in MATLAB, and in many commercial packages), 2004.
16. COLAMD and SYMAMD: ACM Algorithm 836, (appears as `colamd`, `symamd`, and `x=A\b` in MATLAB), 2000.
17. MA38: Harwell Subroutine Library, Fortran version of UMFPACK, 1996.
18. MC47: Harwell Subroutine Library, Fortran version of AMD, 1996.
19. UFget: MATLAB and Java interfaces to the UF Sparse Matrix Collection.
20. Page-rank Demo and A Pretty Seashell: MATLAB Central, Pick of the Week.

Major Commercial Users: Google, Apple, Facebook, The MathWorks, Wolfram Research, Cadence Design Systems, MSC Software, IBM, ANSYS, Berkeley Design Automation, Geomodeling Solutions, ASML, Orcina, ATopTech, Tandent Vision, Vision Map, EnerNex, FEAT, Freescale, Geograf, HRL Laboratories, Intex, Lumerical, Mentor Graphics, SIMetrix, COMSOL, NVIDIA, MSI Kenny.

Major Government Lab Users: HSL Mathematical Subroutine Library; Xyce, Amesos, and Trilinos by Sandia National Labs; Knolls Atomic Power Lab; PETsc by Argonne National Lab, FiPy by NIST.

Major Open-Source Users: Apple, Google Ceres (used for Street View, Photo Tours, and 3D Earth), GEGL (Gimp), Julia, SuperLU, MUMPS, Fedora Linux, Debian Linux, Arch Linux, Ubuntu Linux, OpenSUSE Linux, Scientific Linux, GNU Darwin, DarwinPorts, Fink, Octave, R, ROS, deal.II, scilab, CVX, SDPT3, CVXOPT, MB-Dyn, Boost, OpenSees, CGAL, Kraken, FEniCS, Eigen, SciPy.sparse, Pysparse, NLPy, SfePy, FreeFem++, Elmer, FLOODS/FLOOPS, MILAMIN, ILUPACK, JADAMILU, Cubica, LAMG, LiveV, M.E.S.S., AMDIS, PDCO, MLD2P4, FEATFLOW, FEAST, OpenSLAM.org (g2o, 2D-I-SLSJF, HOG-Man, RobotVision, SLAM6D, SSA2D, MTK, SLOM, iSAM, TJTF for SLAM), SSBA, libdogleg, NGSPICE, hp.fem/Hermes, PATH solver, MESA.

- **Archival Data Collection:**

1. SuiteSparse Matrix Collection, standard benchmark for sparse matrix algorithm development, selected by Amazon.com as a Public Data Set, hosted by Amazon Web Services. (formerly known as the Univ. of Florida Sparse Matrix Collection). <http://sparse.tamu.edu>

• **Refereed Conference Papers or Abstracts**

1. *Parallel GraphBLAS with OpenMP*, M. Aznaveh, J. Chen, S. Kolodziej, T. Davis, T. Mattson, B. Hegyi, and Szárnyas, CSC20, SIAM Workshop on Combinatorial Scientific Computing, 2020.
2. *Write Quick, Run Fast: Sparse Deep Neural Network in 20 Minutes of Development Time via SuiteSparse:GraphBLAS*, T. Davis, M. Aznaveh, and S. Kolodziej, IEEE HPEC'19, Grand Challenge Champion award for high performance, Sept. 2019.
3. *LAGraph: A Community Effort to Collect Graph Algorithms Built on Top of the GraphBLAS*, T. Mattson, T. A. Davis, M. Kumar, A. Buluç, S. McMillan, J. Moreira and C. Yang, GrAPL'19: Workshop on Graphs, Architectures, Programming, and Learning, Rio De Janeiro, Brazil, May 2019.
4. *RedisGraph: GraphBLAS Enabled Graph Database*, P. Cailliau, J. Kepner and T. Davis, GraPL'19, Rio De Janeiro, Brazil.
5. *Graph algorithms via SuiteSparse:GraphBLAS: triangle counting and K-truss*, T. A. Davis, IEEE HPEC'18, Sept. 2018. Grand Challenge Innovation Award.
6. M. Tang, M. Gadou, S. C. Rennich, T. A. Davis, and S. Ranka, *A Multilevel Subtree Method for Single and Batched Sparse Cholesky Factorization*, ICPP'18, Eugene, OR, Aug 2018.
7. C. J. Lourenco, A. R. Escobedo, E. Moreno-Centeno, T. A. Davis, *Roundoff-Error-Free Framework for the Exact Solutions of Sparse Linear Systems*, INFORMS 2017, Houston, October 2017.
8. *SuiteSparse:GraphBLAS: graph algorithms via sparse matrix operations on semirings*, HPEC 2017, invited talk.
9. *SuiteSparse:GraphBLAS: graph algorithms via sparse matrix operations on semirings*, Sparse Days at CERFACS, Toulouse, France, Sept 6-8, 2017, <http://cerfacs.fr/en/actualite/sparse-days-meeting-2017-at-cerfacs/>.
10. T. A. Davis, W. Sid-Lakhdar, *Scalable Sparse Solvers on GPUS*, SIAM Parallel Processing (PP16), 2016, Paris.
11. M. Gadou, T. A. Davis, S. Ranka, *Sparse Matrix Factorization on GPUs*, SIAM Parallel Processing (PP16), 2016, Paris.
12. S. Kolodziej, T. A. Davis, *Vertex Separators with Mixed-Integer Linear Optimization*, SIAM Parallel Processing (PP16), 2016, Paris.
13. P. Bogiatzis, M. Ishii, and T. A. Davis, *Revisiting Seismic Tomography Through Direct Methods and High Performance Computing*, American Geophysical Union Fall Meeting, Dec 2015.
14. Begum Senses, T. A. Davis, Anil V. Rao, *Graph Coarsening Method for KKT Matrices Arising from Orthogonal Collocation Methods for Optimal Control Problems*, 56th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Jan 2015, Kissimmee, FL.
15. S. C. Rennich, D. Stosic, and T. A. Davis, *Accelerating Sparse Cholesky Factorization on GPUs*, IA3 Workshop on Irregular Applications: Architectures and Algorithms, Nov 16, 2014, New Orleans, LA.
16. T. A. Davis, S. Yeralan, *Graph partitioning via quadratic programming*, SIAM Parallel Processing (PP14), 2014, Portland, Oregon.
17. T. A. Davis, S. Ranka, S. Yeralan, *High-performance GPU kernels for multifrontal sparse factorization*, SIAM Parallel Processing (PP14), 2014, Portland, Oregon.
18. T. A. Davis, S. Ranka, S. Yeralan, H. Zandi, S. Chetlur, *Multifrontal Sparse QR Factorization on a GPU*, SIAM Annual meeting, July 2013, San Diego, California.
19. S. Chetlur, S. Yeralan, T. A. Davis, *Versatile Batch QR Factorization on GPUs*, SIAM Conf on Computational Science and Eng., Boston, Massachusetts, Feb. 2013.
20. T. A. Davis, *Supernodal and Multifrontal Sparse Matrix Factorization*, SIAM Conf on Computational Science and Eng., Boston, Massachusetts, Feb. 2013.
21. T. A. Davis, *FACTORIZE: an object-oriented linear system solver for MATLAB*, SIAM Annual meeting, July 2012, Atlanta, Georgia.

22. T. A. Davis, S. Ranka, S. Chetlur, S. Yeralan, *Multifrontal sparse QR factorization on the GPU*, SIAM Conf. on Parallel Processing, Savannah, Georgia, Feb. 2012.
23. T. A. Davis, *Sparse Cholesky Update/Downdate and its Applications*, ICIAM 2011 (7th Intl. Congress on Industrial and Applied Mathematics), July 2011.
24. T. A. Davis, *Sparse matrix methods for circuit simulation*, Proceedings of SCEE10 (Scientific Computing for Electrical Engineering), Toulouse, France, Sept 2010.
25. T. A. Davis, *Rank-revealing Parallel Sparse QR Factorization*, SIAM Annual meeting, July 15, 2010.
26. S. Rajamanickam, T. A. Davis, G. Golub. *Blocked Bidiagonal reduction of Sparse Matrices using Givens Rotations*, SIAM Parallel Processing '08, Atlanta, GA, March 2008.
27. T. A. Davis, *Sparse Matrix Research and Software Development at the University of Florida*, SIAM Annual Meeting, San Diego, CA (SIAM AN08).
28. T. A. Davis, W. Hager, *Dynamic Supernodes in Sparse Cholesky Update/Downdate for Active Set Methods*, SIAM Annual Meeting, San Diego, CA (SIAM AN08)
29. T. A. Davis, *Sparse matrix factorization: looking left, looking right, looking up*, Householder XVI Symposium, April 2005.
30. T. A. Davis, *Linear solvers for sparse matrices in circuit simulation*, SIAM Parallel Processing, San Francisco, 2004.
31. T. A. Davis, *A Sparse Singular Value Decomposition*, Semi-plenary talk at Foundations of Computational Mathematics, Minneapolis, 5-14 August 2002.
32. T. A. Davis, *Towards a Sparse Singular Value Decomposition, and Modifying a Sparse Cholesky Factorization*, Householder Symposium XV, June 2002, Peebles, Scotland.
33. T. A. Davis, *Modifying a Sparse Cholesky Factorization*, 2002 SIAM Conference on Optimization, Toronto, Canada.
34. W. W. Hager, T. A. Davis, Y. Krylyuk, and S. C. Park, *Graph Partitioning and Quadratic Programming*, Presentation at the Workshop on Graph Partitioning & Applications: Current and Future Directions, October 14, 1999, Army High Performance Computing Research Center, Minneapolis, MN. Organized by Rupak Biswas, Bruce Hendrickson, George Karypis, and Vipin Kumar.
35. T. A. Davis, J. R. Gilbert, S. Larimore, E. Ng, and B. Peyton, *A column approximate minimum degree ordering algorithm*, SIAM Conference on Applied Linear Algebra, Oct. 1997.
36. T. A. Davis and W. W. Hager, *Modifying a sparse Cholesky factorization*. SIAM Conference on Applied Linear Algebra, Oct. 1997.
37. P. R. Amestoy, T. A. Davis, I. S. Duff, and S. M. Hadfield, *Parallelism in multifrontal methods for matrices with unsymmetric structures*, 2nd SIAM Conference on Sparse Matrices, Oct. 1996.
38. Y. Campbell, T. A. Davis, *Computing the sparse inverse subset: an inverse multifrontal approach*, 2nd SIAM Conference on Sparse Matrices, Oct. 1996.
39. P. R. Amestoy, T. A. Davis, I. S. Duff, *Approximate degrees in sparsity-preserving orderings for symmetric and unsymmetric matrices*, 2nd SIAM Conference on Sparse Matrices, Oct. 1996.
40. T. A. Davis, J. R. Gilbert, E. Ng, and B. Peyton, *A column approximate minimum degree ordering algorithm*, 2nd SIAM Conference on Sparse Matrices, Oct. 1996, and XIII Householder Symp. on Numerical Linear Algebra, June 1996 (presented by E. Ng).
41. S. M. Hadfield and T. A. Davis, *A distributed memory, multifrontal method for sequences of unsymmetric-pattern matrices*, Proceedings of the 24th International Conference on Parallel Processing, (ICPP '95), Wisconsin, Aug. 1995, pp. 42-45. (27.8% acceptance rate).
42. T. Rashid and T. A. Davis, *An approach for parallelizing any general unsymmetric sparse matrix algorithm*, Proceedings of the Seventh SIAM Conference on Parallel Processing for Scientific Computation, San Francisco, CA, Feb. 1995, pp. 413-417.
43. T. A. Davis, *A combined unifrontal/multifrontal method for unsymmetric sparse matrices*, Proceedings of the Fifth SIAM Conference on Applied Linear Algebra, Snowbird, Utah, June 1994, pp. 413-417.
44. S. M. Hadfield and T. A. Davis, *Potential and achievable parallelism in the unsymmetric-pattern multifrontal LU factorization method for sparse matrices*, Proceedings of the Fifth SIAM Conference on Applied Linear Algebra, Snowbird, Utah, June 1994, pp. 387-391.

45. S. E. Zitney, J. Mallya, T. A. Davis, and M. A. Stadtherr, *Multifrontal techniques for chemical process simulation on supercomputers*, Proceedings of the Fifth International Symposium on Process Systems Engineering, Kyongju, Korea, May 1994, pp. 25-30.
46. T. A. Davis, *Performance of an unsymmetric-pattern multifrontal method for sparse LU factorization* (invited paper), Advances in Computer Methods for Partial Differential Equations VII, R. Vichnevetsky, D. Knight, and G. Richter (editors), International Association for Mathematics and Computers in Simulation, New Brunswick, NJ, June 1992, pp. 170-176.
47. T. A. Davis, *Performance of an unsymmetric-pattern multifrontal algorithm for parallel sparse LU factorization* (invited abstract), Abstracts of the Seventh IMACS International Conference on Computer Methods for Partial Differential Equations, Rutgers University, New Brunswick, NJ, June 1992, pp. 19.
48. T. Johnson and T. A. Davis, *Space efficient parallel buddy memory management*, Proceedings of the Third International Conference on Computing and Information, Toronto, Ontario, May 1992, pp. 128-132.
49. T. A. Davis and I. S. Duff, *An unsymmetric-pattern multifrontal method*, Abstracts of the Second International Conference on Industrial and Applied Mathematics, Society for Industrial and Applied Mathematics, Washington, DC, July 1991, pp. 52.
50. T. A. Davis, *Parallel algorithms for the direct solution of sparse linear systems*, Proceedings of the Second World Congress on Computational Mechanics, Stuttgart, Germany, Aug. 1990, pp. 960-963.
51. T. A. Davis and P.-C. Yew, *A stable parallel algorithm for general unsymmetric sparse LU factorization*, Proceedings of the SIAM Symposium on Sparse Matrices, SIAM Activity Group on Linear Algebra, Gleneden Beach, Oregon, May 1989, pp. 46-47.
52. S. G. Abraham and T. A. Davis, *Blocking and clustering for sparse linear system solvers*, Proceedings of the 17th International Conference on Parallel Processing, St. Charles, Illinois, vol. 1, Aug. 1988, pp. 166-173.
53. T. A. Davis and E. S. Davidson, *PSolve: a concurrent algorithm for solving sparse systems of linear equations*, Proceedings of the 16th International Conference on Parallel Processing, St. Charles, Illinois, Aug. 1987, pp. 483-490.
54. T. A. Davis, R. P. Kunda, and W. K. Fuchs, *Testing of bit-serial multipliers*, Proceedings of the International Conference on Computer Design, Port Chester, New York, Oct. 1985, pp. 430-434.

- **Creative work and other publications:**

1. R. Ames (composer), T. Davis (text author), *Hiraeth*, a chorale piece for piano or harp, and choir, <https://www.giamusic.com/store/resource/hiraeth-satb-edition-print-g9422>. Also in a TTBB edition at <https://www.giamusic.com/store/resource/hiraeth-ttbb-edition-print-g9477>.
2. T. Davis, *Sparse matrices and the London Electronic Music Scene*, SIAM Blog, March 11, 2014.
3. London Electronic Arts Festival, 2013. Five commissioned pieces of algorithmic artwork. <http://leaflondon.net>. See also <http://notesartstudio.com>.
4. T. A. Davis, *Creating sparse matrices in MATLAB*, published as a guest blog by The MathWorks, March 2007, at <http://blogs.mathworks.com/loren/2007/03/01/creating-sparse-finite-element-matrices-in-matlab/>

- **Research Funding:** Total of \$5.7 million: \$3.7 million as PI.

- Auto-tunable and Energy-aware Sparse Direct Methods on Heterogeneous Architectures, \$1.2 million, NSF. (Texas A&M portion: \$400,000). In collaboration with Jack Dongarra, UTK, and Sanjay Ranka UF. Co-Principal investigator, Sept 2015-2018.
- KLU+GPU: GPU-accelerated sparse direct method for circuit simulation, Lawrence Livermore National Lab, \$90,485. Principal investigator, Sept 2015-2016.
- NVIDIA CUDA Research Center at Texas A&M, Principal investigator, June 2014.
- Texas A&M startup package, \$1,000,000, June 2014.
- Google Open Source Software Award, 2012, \$5,000.
- NVIDIA Academic Partner, 2011, \$29,000.
- *Sparse Direct Methods on High-Performance Heterogeneous Architectures*, 2011-2014, NSF, \$310,000.
- *Scalable Sparse Matrix Algorithms for Nonlinear Optimization*, 2006-2010, NSF, \$460,000 (co-PI).
- Berkeley Design Automation, Inc., 2005, \$30,000.

- *Sparse Matrix Algorithms for Circuit Simulation*, 2005, Sandia National Lab, \$76,000.
- *Sparse Matrix Algorithms for Circuit Simulation*, 2004, Sandia National Lab, \$59,579.
- *UF 2003/2004 Special Year in Mathematics*, NSF, \$30,000 (co-PI).
- Sabbatical 2002-2003: Stanford (\$23,000), Lawrence Berkeley Nat. Lab (\$35,000), MathWorks (\$15,000).
- *Sparse Matrix Algorithms and Their Application to Dual Active Set Techniques in Optimization*, 2002-2006, NSF, \$510,000.
- *An Investigation into Aesthetic Computing within the Digital Arts and Sciences Curricula*, 2001-2004, NSF, \$436,140 (co-PI).
- *Innovative Sparse Matrix Algorithms*, 1998-2001, NSF, \$192,729.
- *Employer Focus Groups*, 2000, SUCCEED, \$32,000 (co-PI).
- *Effectiveness of student, alumni, and employer surveys for assessment of the computer engineering program*, 1999-2000, SUCCEED, \$5,000.
- *Sparse matrix problems: data structures, algorithms, and applications*, 1995-1998, NSF, \$250,500.
- *Algorithms and tools for parallel sparse LU factorization*, 1993-1995, NSF, \$88,081.
- *An unsymmetric-pattern multifrontal method for parallel sparse LU factorization*, 1991-1993, NSF Research Initiation Award, \$47,937.

- **Consulting Activities:**

The MathWorks (Master Consultant, 2002 to date), Mentor Graphics, Berkeley Design Automation, Sandia National Laboratory, COMSOL, Schaeffer Simulation, and Cray Research

- **Graduate Students:**

- Mohamed Gadou (PhD, in progress)
- Jinbin Ju (PhD, in progress)
- Scott Kolodziej (PhD, in progress)
- Mohsen Aznavah (PhD, in progress)
- Nuri Yeralan (PhD, 2014)
- Sharanyan Chetlur (MS, 2012)
- Sivasankaran Rajamanickam (PhD, 2010)
- Ekanathan Palamadai (MS, 2009)
- Adrian Mascarenhas (MS, 2001)
- Vishnu Sadhana (MS, 2001)
- Stefan Larimore, (MS, 1998)
- Steven Morgan (MS, 1997)
- Yogin Campbell (PhD, 1996)
- Tariq Rashid (M. Eng., 1995)
- Steven M. Hadfield (PhD, 1994)
- Ahmad Safa, (MS, 1992)

- **Conference Program Committee Membership and Organization:**

- SIAM Workshop Celebration 40 Years of Nested Dissection, University of Waterloo, Canada, 2013.
- SIAM Workshop on Combinatorial Scientific Computing, Monterey, CA, 2009,
- IASTED Intl. Conf. on Parallel and Distributed Computing Networks, Innsbruck, Austria, 2009.
- Computer Aspects of Numerical Algorithms, 2008.
- 3rd IASTED Intl. Conf. on Advances in Computer Science & Technology. Phuket, Thailand, 2007.
- Computer Aspects of Numerical Algorithms workshop, 2007.
- SuperComputing 2006.
- 2nd IASTED Intl. Conf. on Advances in Computer Science & Technology, Puerto Vallarta, Mexico, 2006.
- 4th Intl. Workshop on Parallel Matrix Algorithms and Applications, Rennes, France, 2006.
- Co-organizer, Workshop on Multiscale Optimization: Methods & Applications, Univ. of Florida, 2004.
- Intl. Conf. on High Performance Computing, Bangalore, India, 2002.
- 8th Intl. Workshop on Solving Irregularly Structured Problems in Parallel, San Francisco, 2001.
- Program committee co-chair, 7th Intl. Workshop on Solving Irregularly Structured Problems in Parallel, 2000.
- 11th IASTED Intl. Conf. on Parallel and Distributed Computing and Systems, Cambridge, 1999.

- 12th Intl. Parallel Processing Symposium, 1998.
- 9th Symposium on Parallel and Distributed Processing, 1998.
- 3rd Intl. Conf. on High Performance Computing, 1996.
- 2nd Intl. Conf. on High Performance Computing, Goa, India, 1995.

● **Invited Talks (since 2001):**

- *SuiteSparse:GraphBLAS: a complete implementation of the GraphBLAS specification*, 2017 IEEE High Performance Extreme Computing Conference (HPEC '17), Waltham, Massachusetts, Sept 12-14, 2017.
- *Math, Matrices, and Music*, Expressive 2017, July, 2017, Los Angeles. <https://expressivesymposium.com/home/keynotes/>, Keynote speaker.
- *Math, Matrices, and Music*, UT Arlington, Nov 2016.
- Workshop on Fast Direct Solvers, Purdue Univ., Nov 2016
- Plenary speaker, 5th IMA Conf. on Numerical Linear Algebra and Optimization, Univ of Birmingham, UK, Sept 2016.
- Keynote speaker, Symposium on Geometry Processing, Berlin, June 2016.
- *Mathematical Software Development in Academic, Industry, and Government Labs: A Personal Perspective*, Scientific Software Days, Feb 2016.
- *Sparse Matrix Algorithms: combinatorics + numerical methods + applications*, Lawrence Livermore National Lab, June 2015.
- *Sparse Matrix Algorithms: combinatorics + numerical methods + applications*, UT Austin, Jan 27, 2015.
- *Sparse Matrix Algorithms: combinatorics + numerical methods + applications*, Illinois Institute of Technology, Sept 29, 2014.
- T. A. Davis, *The Scholarly work of reliable and well-designed mathematical software*, SIAM AN14 annual meeting, Chicago, July 2014.
- T. A. Davis, *Multifrontal Sparse QR Factorization on a GPU*, NVIDIA GTC 2014, San Jose, California, March 2014.
- *Sparse Matrix Algorithms: combinatorics + numerical methods + applications*, Texas A&M, Mar 3, 2014
- *Sparse Matrix Algorithms: combinatorics + numerical methods + applications*, NC State, Jan 8, 2014
- *Sparse multifrontal QR factorization on the GPU*, Univ of Manchester, Nov 8, 2013
- *Sparse multifrontal QR factorization on the GPU*, Oxford University / Rutherford Appleton Lab, Nov 7, 2013
- *Sparse multifrontal QR factorization on the GPU*, NVIDIA, Palo Alto, June 6, 2013
- *Sparse multifrontal QR factorization on the GPU*, ICME, Stanford, June 6, 2013
- *Sparse Matrix Algorithms: combinatorics + numerical methods + applications*, ICME, Stanford, June 5, 2013
- *Multi-level edge separator using a hybrid combinatorial-quadratic programming approach*, Workshop on Graph and Hypergraph Problems in Computational Science, sponsored by the Institute for Computing in Science, Argonne National Lab, 2012.
- *The Beauty of Mathematics*, Harn Museum, Gainesville, Florida, October 2011.
- *Sparse multifrontal QR factorization*, invited seminar, NVIDIA, Santa Clara, CA, June 2011.
- *Sparse singular-value decompositions*, invited presentation, ENSEEIHT, Toulouse, France, Sept 22, 2010.
- *Sparse Singular Value Decomposition*, Univ. of Michigan, Aug 2010.
- Banff International Research Station, Canada, 2009.
- Dagstuhl Seminar, Combinatorial Scientific Computing, Feb 2009.
- *The History of UMFPACK and AMD*, CERFACS 20th Anniversary Meeting, Oct 10-12, 2007, Toulouse, France.
- *Sparse direct methods*, Plenary talk, SIAM Annual Meeting, July 2006.
- *Direct methods for sparse linear systems*, invited talk, The MathWorks, July 2006.
- *Looking left, looking right*, MIT, Oct. 2004.

- *A column-preordering method for unsymmetric sparse factorization*, Sandia National Labs, Aug. 2003.
 - *A column-preordering method for unsymmetric sparse factorization*, Sparse Days at St. Giron, June 2003.
 - *A sparse singular value decomposition*, Stanford University, 2002, UC Berkeley, 2002. and Lawrence Berkeley National Lab, 2002.
 - *Sparse Matrix Algorithms*, Workshop on Numerical Aspects of Circuit and Device Simulation, Santa Fe, NM. Sponsored by Sandia National Labs, April 2002
 - *A Sparse Singular Value Decomposition*, July 2001, Purdue University.
 - *Modifying a Sparse Cholesky Factorization*, Stanford University, June 2001.
 - *Modifying a Sparse Cholesky Factorization*, Lawrence Berkeley National Lab, June 2001.
- **Major University, College, and Departmental Service:**
 - Elected Member of the Faculty Senate, 2016, Texas A&M University.
 - Elected Member of the College of Engineering Faculty Council, 2016, Texas A&M University.
 - Speaker of the Departmental Steering Committee, Dept. of Computer and Information Science and Engineering (CISE), University of Florida, 2013 to 2014.
 - Chair of the Faculty Council for the College of Engineering, 2007-2008.
 - College of Engineering Tenure & Promotion Committee, 2012 to 2014.
 - College of Engineering Faculty Council, 2004-2008.
 - University of Florida Faculty Senate, 2003-2008.
 - Chair, CISE Departmental Tenure & Promotion Committee, University of Florida, 2012 to 2014.
 - Search Consultation Committee for CISE Departmental Chair, University of Florida, 2012.
 - Chair, CISE Departmental Awards Committee, University of Florida, 2009 to 2013.
 - CISE Departmental Strategic Planning Committee, University of Florida, 2011.
 - CISE Departmental ByLaws Committee, University of Florida, 2012.
 - College Awards Committee, 2011 to 2013.
 - Chair, Departmental CISE Curriculum and ABET Accreditation Committee, University of Florida, 1997-2002.
 - Search Committee for CISE Departmental Chair, University of Florida, 2001.
 - CISE Departmental ABET Accreditation Committee, University of Florida, 1993-1997.
- **Service to K-12 schools:**
 - Advisor, Cornerstone Academy Robotics, 2010, 2012.
 - Guest lecturer, Algebra II, Cornerstone Academy, 2007
- **Press Articles:**
 - *Hullabalo!*, Texas A&M Spirit Magazine, Summer, 2017.
 - *Seeing Sound: A&M Professor Creates Electronic Art with Music*, The Battalion, Texas A&M University, Mar 20, 2017, and ACM TechNews, Mar 24, 2017.
 - *Art and Math Collide to Create Visible Songs*, Texas A&M Today, Feb 8, 2017.
 - *Seeing songs: algorithms covert songs into something that can be seen*, Texas A&M Engineering News, Jan 30, 2017.
 - *Six computer science and engineering faculty members receive College of Engineering Faculty Awards*, Texas A&M Engineering News, Feb 2, 2017.
 - *One Man's Unforeseen Impact on Technology*, Texas A&M Engineering News, Nov 1, 2016.
 - *Davis named IEEE Fellow*, Texas A&M Eng. News, Jan. 7, 2016.
 - *Tim Davis Recognized as ACM Fellow*, Texas A&M Eng. News, Jan. 8, 2015.
 - *ACM Names Fellows for Innovations in Computing*, ACM, Jan. 8, 2015.
 - *Reveille VIII makes memorable visit to CSE class*, Texas A&M Eng. News, Dec. 16, 2014.
 - *A&M mascot Reveille VIII pops up in class, helps with quiz*, Houston Chronicle, Dec. 19, 2014.
 - *Renowned Professor of Computer Science Joining CSE Faculty*, Kathy Flores, Dwight Look College of Engineering, Texas A&M University, press release, July 1, 2014.
 - *Sparse Matrices and the London Electronic Music Scene*, SIAM Blog, March 11, 2014.
 - *Music, Sparse Matrices, and London Billboard*, Cleve's Corner, Cleve Moler, March 3, 2014.

- *Experimental Palette*, UF Explore, Spring 2013.
 - *Introducing Ceres Solver - A Nonlinear Least Squares Solver*, Google Open Source Blog, Sameer Agarwal & Keir Mierle, May 2012.
 - *Pretty Math Problem*, IEEE Spectrum, Oct. 2010, pp. 18-19.
 - *Geeky Science Problems Double as Works of Art*, Suzanne Labarre, FastCo Design, Aug. 17, 2010.
 - *The most intense moments the universe has ever know are the next 15 seconds*, But does it float, Atley G. Kaskey, Art Center College of Design, Los Angeles, and Folkert Gorter, Superfamous.
 - *Sparse Matrix Algorithm Drives SPICE Performance Gains*, SIAM News, May 2007.
 - *Speedy Spice-accurate simulator targets analog, RF*, EDN, July 24, 2006.
- Last updated October 3, 2019.