

# Bibliography `njhigham.bib`

Nicholas J. Higham\*

February 2, 2021

Blue denotes clickable links.

## References

- [1] Ahmad Abdelfattah, Hartwig Anzt, Erik G. Boman, Erin Carson, Terry Cojean, Jack Dongarra, Mark Gates, Thomas Grützmacher, Nicholas J. Higham, Sherry Li, Neil Lindquist, Yang Liu, Jennifer Loe, Piotr Luszczek, Pratik Nayak, Srikara Pranesh, Siva Rajamanickam, Tobias Ribizel, Barry Smith, Kasia Swirydowicz, Stephen Thomas, Stanimire Tomov, Yaohung M. Tsai, Ichitaro Yamazaki, and Urike Meier Yang. [A survey of numerical methods utilizing mixed precision arithmetic](#). ArXiv:2007.06674, July 2020. 44 pp.
- [2] Ahmad Abdelfattah, Timothy Costa, Jack Dongarra, Mark Gates, Azam Haidar, Sven Hammarling, Nicholas J. Higham, Jakub Kurzak, Piotr Luszczek, Stanimire Tomov, and Mawussi Zounon. A set of Batched Basic Linear Algebra Subprograms and LAPACK routines. *ACM Trans. Math. Software*, 2020. To appear.
- [3] Awad H. Al-Mohy and Nicholas J. Higham. [Computing the Fréchet derivative of the matrix exponential, with an application to condition number estimation](#). *SIAM J. Matrix Anal. Appl.*, 30(4):1639–1657, 2009.

---

\*School of Mathematics, University of Manchester, Manchester, M13 9PL, UK  
([nick.higham@manchester.ac.uk](mailto:nick.higham@manchester.ac.uk), <http://www.maths.manchester.ac.uk/~higham>)

- [4] Awad H. Al-Mohy and Nicholas J. Higham. [A new scaling and squaring algorithm for the matrix exponential](#). *SIAM J. Matrix Anal. Appl.*, 31(3):970–989, 2009.
- [5] Awad H. Al-Mohy and Nicholas J. Higham. [The complex step approximation to the Fréchet derivative of a matrix function](#). *Numer. Algorithms*, 53(1):133–148, 2010.
- [6] Awad H. Al-Mohy and Nicholas J. Higham. [Computing the action of the matrix exponential, with an application to exponential integrators](#). *SIAM J. Sci. Comput.*, 33(2):488–511, 2011.
- [7] Awad H. Al-Mohy and Nicholas J. Higham. [Improved inverse scaling and squaring algorithms for the matrix logarithm](#). *SIAM J. Sci. Comput.*, 34(4):C153–C169, 2012.
- [8] Awad H. Al-Mohy, Nicholas J. Higham, and Samuel D. Relton. [Computing the Fréchet derivative of the matrix logarithm and estimating the condition number](#). *SIAM J. Sci. Comput.*, 35(4):C394–C410, 2013.
- [9] Awad H. Al-Mohy, Nicholas J. Higham, and Samuel D. Relton. [New algorithms for computing the matrix sine and cosine separately or simultaneously](#). *SIAM J. Sci. Comput.*, 37(1):A456–A487, 2015.
- [10] Hartwig Anzt, Jack Dongarra, Goran Flegar, Nicholas J. Higham, and Enrique S. Quintana-Ortí. [Adaptive precision in block-Jacobi preconditioning for iterative sparse linear system solvers](#). *Concurrency Computat. Pract. Exper.*, 31(6):e4460, 2019.
- [11] Mary Aprahamian, Desmond J. Higham, and Nicholas J. Higham. [Matching exponential-based and resolvent-based centrality measures](#). *Journal of Complex Networks*, 4(2):157–176, 2016.
- [12] Mary Aprahamian and Nicholas J. Higham. [The matrix unwinding function, with an application to computing the matrix exponential](#). *SIAM J. Matrix Anal. Appl.*, 35(1):88–109, 2014.
- [13] Mary Aprahamian and Nicholas J. Higham. Argument reduction for computing periodic functions. MIMS EPrint, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, 2015. In preparation.

- [14] Mary Aprahamian and Nicholas J. Higham. [Matrix inverse trigonometric and inverse hyperbolic functions: Theory and algorithms](#). *SIAM J. Matrix Anal. Appl.*, 37(4):1453–1477, 2016.
- [15] Wayne Arter, J. Guy Morgan, Samuel D. Relton, and Nicholas J. Higham. [Ranking the importance of nuclear reactions for activation and transmutation events](#). *Nuclear Science and Engineering*, 184(4): 561–574, 2016.
- [16] Susanne M. Balle, Per Christian Hansen, and Nicholas J. Higham. A Strassen-type matrix inversion algorithm for the Connection Machine. Technical Report CNC/1993/028, Centre for Novel Computing, University of Manchester, Manchester, England, October 1993. 29 pp.
- [17] Timo Betcke, Nicholas J. Higham, Volker Mehrmann, Christian Schröder, and Françoise Tisseur. NLEVP: A collection of nonlinear eigenvalue problems. <https://github.com/ftisseur/nlevp>.
- [18] Timo Betcke, Nicholas J. Higham, Volker Mehrmann, Christian Schröder, and Françoise Tisseur. NLEVP: A collection of nonlinear eigenvalue problems. MIMS EPrint 2011.116, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, December 2011. 27 pp.
- [19] Timo Betcke, Nicholas J. Higham, Volker Mehrmann, Christian Schröder, and Françoise Tisseur. NLEVP: A collection of nonlinear eigenvalue problems. Users’ guide. MIMS EPrint 2011.117, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, December 2011. 8 pp.
- [20] Timo Betcke, Nicholas J. Higham, Volker Mehrmann, Christian Schröder, and Françoise Tisseur. [NLEVP: A collection of nonlinear eigenvalue problems](#). *ACM Trans. Math. Software*, 39(2):7:1–7:28, 2013.
- [21] Iain Bethune, J. Mark Bull, Nicholas J. Dingle, and Nicholas J. Higham. [Investigating the performance of asynchronous Jacobi’s method for solving systems of linear equations](#). MIMS EPrint 2011.82, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, October 2011. 8 pp.

- [22] Iain Bethune, J. Mark Bull, Nicholas J. Dingle, and Nicholas J. Higham. [Performance analysis of asynchronous Jacobi’s method implemented in MPI, SHMEM and OpenMP](#). *Int. J. High Performance Computing Applications*, 28(1):97–111, 2014.
- [23] Dario A. Bini, Nicholas J. Higham, and Beatrice Meini. [Algorithms for the matrix  \$p\$ th root](#). *Numer. Algorithms*, 39(4):349–378, 2005.
- [24] Pierre Blanchard, Desmond J. Higham, and Nicholas J. Higham. [Accurately computing the log-sum-exp and softmax functions](#). *IMA J. Numer. Anal.*, pages 1–20, 2020. Advance access.
- [25] Pierre Blanchard, Nicholas J. Higham, Florent Lopez, Theo Mary, and Srikanth Pranesh. [Mixed precision block fused multiply-add: Error analysis and application to GPU tensor cores](#). *SIAM J. Sci. Comput.*, 42(3):C124–C141, 2020.
- [26] Pierre Blanchard, Nicholas J. Higham, and Theo Mary. [A class of fast and accurate summation algorithms](#). *SIAM J. Sci. Comput.*, 42(3):A1541–A1557, 2020.
- [27] Adam Bojanczyk, Nicholas J. Higham, and Harikrishna Patel. [The equality constrained indefinite least squares problem: Theory and algorithms](#). *BIT*, 43(3):505–517, 2003.
- [28] Adam Bojanczyk, Nicholas J. Higham, and Harikrishna Patel. [Solving the indefinite least squares problem by hyperbolic QR factorization](#). *SIAM J. Matrix Anal. Appl.*, 24(4):914–931, 2003.
- [29] Rüdiger Borsdorf and Nicholas J. Higham. [A preconditioned Newton algorithm for the nearest correlation matrix](#). *IMA J. Numer. Anal.*, 30(1):94–107, 2010.
- [30] Rüdiger Borsdorf, Nicholas J. Higham, and Marcos Raydan. [Computing a nearest correlation matrix with factor structure](#). *SIAM J. Matrix Anal. Appl.*, 31(5):2603–2622, 2010.
- [31] Thierry Braconnier and Nicholas J. Higham. [Computing the field of values and pseudospectra using the Lanczos method with continuation](#). *BIT*, 36(3):422–440, 1996.

- [32] David P. Carlisle and Nicholas J. Higham.  $\text{\LaTeX 2}_{\epsilon}$ : Should you upgrade to it? *SIAM News*, 29(1):12, 1996.
- [33] Erin Carson and Nicholas J. Higham. [A new analysis of iterative refinement and its application to accurate solution of ill-conditioned sparse linear systems](#). *SIAM J. Sci. Comput.*, 39(6):A2834–A2856, 2017.
- [34] Erin Carson and Nicholas J. Higham. [Accelerating the solution of linear systems by iterative refinement in three precisions](#). *SIAM J. Sci. Comput.*, 40(2):A817–A847, 2018.
- [35] Erin Carson, Nicholas J. Higham, and Srikara Pranes. [Three-precision GMRES-based iterative refinement for least squares problems](#). *SIAM J. Sci. Comput.*, 42(6):A4063–A4083, 2020.
- [36] Sheung Hun Cheng and Nicholas J. Higham. [A modified Cholesky algorithm based on a symmetric indefinite factorization](#). *SIAM J. Matrix Anal. Appl.*, 19(4):1097–1110, 1998.
- [37] Sheung Hun Cheng and Nicholas J. Higham. [The nearest definite pair for the Hermitian generalized eigenvalue problem](#). *Linear Algebra Appl.*, 302-303:63–76, 1999.
- [38] Sheung Hun Cheng and Nicholas J. Higham. Implementation for LAPACK of a block algorithm for matrix 1-norm estimation. Numerical Analysis Report No. 393, Manchester Centre for Computational Mathematics, UK, August 2001. 19 pp. LAPACK Working Note 152.
- [39] Sheung Hun Cheng and Nicholas J. Higham. Parallel implementation of a block algorithm for matrix 1-norm estimation. In *Euro-Par 2001, Parallel Processing*, Rizos Sakellariou, John Keane, John Gurd, and Len Freeman, editors, volume 2150 of *Lecture Notes in Computer Science*, Springer-Verlag, Berlin, Germany, 2001, pages 568–577.
- [40] Sheung Hun Cheng, Nicholas J. Higham, Charles S. Kenney, and Alan J. Laub. Return to the middle ages: A half-angle iteration for the logarithm of a unitary matrix. In *Proceedings of the Fourteenth International Symposium of Mathematical Theory of Networks and Systems, Perpignan, France*, 2000. CD ROM.

- [41] Sheung Hun Cheng, Nicholas J. Higham, Charles S. Kenney, and Alan J. Laub. [Approximating the logarithm of a matrix to specified accuracy](#). *SIAM J. Matrix Anal. Appl.*, 22(4):1112–1125, 2001.
- [42] Michael P. Connolly, Nicholas J. Higham, and Theo Mary. [Stochastic rounding and its probabilistic backward error analysis](#). MIMS EPrint 2020.12, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, April 2020. 20 pp. Revised August 2020. To appear in *SIAM J. Sci. Comput.*
- [43] Robert M. Corless, Hui Ding, Nicholas J. Higham, and David J. Jeffrey. [The solution of  \$S \exp\(S\) = A\$  is not always the Lambert  \$W\$  function of  \$A\$](#) . In *ISSAC '07: Proceedings of the 2007 International Symposium on Symbolic and Algebraic Computation*, New York, 2007, pages 116–121. ACM Press.
- [44] Robert M. Corless, Nicholas J. Higham, and Steven E. Thornton. [Cover image: Bohemian matrices](#). *LMS Newsletter*, 491:16, 2020.
- [45] Anthony J. Cox and Nicholas J. Higham. Stability of Householder QR factorization for weighted least squares problems. In *Numerical Analysis 1997, Proceedings of the 17th Dundee Biennial Conference*, D. F. Griffiths, D. J. Higham, and G. A. Watson, editors, volume 380 of *Pitman Research Notes in Mathematics*, Addison Wesley Longman, Harlow, Essex, UK, 1998, pages 57–73.
- [46] Anthony J. Cox and Nicholas J. Higham. [Accuracy and stability of the null space method for solving the equality constrained least squares problem](#). *BIT*, 39(1):34–50, 1999.
- [47] Anthony J. Cox and Nicholas J. Higham. [Backward error bounds for constrained least squares problems](#). *BIT*, 39(2):210–227, 1999.
- [48] Anthony J. Cox and Nicholas J. Higham. [Row-wise backward stable elimination methods for the equality constrained least squares problem](#). *SIAM J. Matrix Anal. Appl.*, 21(1):313–326, 1999.
- [49] Philip I. Davies and Nicholas J. Higham. Generating test matrices for the one- and two-sided Jacobi methods. Numerical Analysis Report No. 338, Manchester Centre for Computational Mathematics, UK, January 1999. 13 pp.

- [50] Philip I. Davies and Nicholas J. Higham. [Numerically stable generation of correlation matrices and their factors](#). *BIT*, 40(4):640–651, 2000.
- [51] Philip I. Davies and Nicholas J. Higham. [A Schur–Parlett algorithm for computing matrix functions](#). *SIAM J. Matrix Anal. Appl.*, 25(2): 464–485, 2003.
- [52] Philip I. Davies and Nicholas J. Higham. Computing  $f(A)b$  for matrix functions  $f$ . In *QCD and Numerical Analysis III*, Artan Boriçi, Andreas Frommer, Bálint Joó, Anthony Kennedy, and Brian Pendleton, editors, volume 47 of *Lecture Notes in Computational Science and Engineering*, Springer-Verlag, Berlin, Germany, 2005, pages 15–24.
- [53] Philip I. Davies, Nicholas J. Higham, and Françoise Tisseur. [Analysis of the Cholesky method with iterative refinement for solving the symmetric definite generalized eigenproblem](#). *SIAM J. Matrix Anal. Appl.*, 23(2):472–493, 2001.
- [54] Edvin Deadman and Nicholas J. Higham. Testing matrix function algorithms using identities. <http://blog.nag.com/2014/04/testing-matrix-function-algorithms.html>, 2014.
- [55] Edvin Deadman and Nicholas J. Higham. [Testing matrix function algorithms using identities](#). *ACM Trans. Math. Software*, 42(1):4:1–4:15, 2016.
- [56] Edvin Deadman, Nicholas J. Higham, and Rui Ralha. [Blocked Schur algorithms for computing the matrix square root](#). In *Applied Parallel and Scientific Computing: 11th International Conference, PARA 2012, Helsinki, Finland*, P. Manninen and P. Öster, editors, volume 7782 of *Lecture Notes in Computer Science*, Springer-Verlag, Berlin, Germany, 2013, pages 171–182.
- [57] James W. Demmel and Nicholas J. Higham. [Stability of block algorithms with fast level-3 BLAS](#). *ACM Trans. Math. Software*, 18(3): 274–291, 1992.
- [58] James W. Demmel and Nicholas J. Higham. [Improved error bounds for underdetermined system solvers](#). *SIAM J. Matrix Anal. Appl.*, 14(1):1–14, 1993.

- [59] James W. Demmel, Nicholas J. Higham, and Robert S. Schreiber. [Stability of block  \$LU\$  factorization](#). *Numer. Linear Algebra Appl.*, 2(2): 173–190, 1995.
- [60] Nicholas J. Dingle and Nicholas J. Higham. [Reducing the influence of tiny normwise relative errors on performance profiles](#). *ACM Trans. Math. Software*, 39(4):24:1–24:11, 2013.
- [61] Jack Dongarra, Iain Duff, Mark Gates, Azzam Haidar, Sven Hammarling, Nicholas J. Higham, Jonathon Hogg, Pedro Valero-Lara, Samuel D. Relton, Stanimire Tomov, and Mawussi Zounon. [A proposed API for Batched Basic Linear Algebra Subprograms](#). MIMS EPrint 2016.25, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, April 2016. 20 pp.
- [62] Jack Dongarra, Laura Grigori, and Nicholas J. Higham. [Numerical algorithms for high-performance computational science](#). *Phil. Trans. R. Soc. A*, 378(2166):1–18, 2020.
- [63] Jack Dongarra, Sven Hammarling, Nicholas J. Higham, Samuel D. Relton, Pedro Valero-Lara, and Mawussi Zounon. [Creating a standardised set of batched BLAS routines](#). In *Proceedings of the Fourth Workshop on Sustainable Software for Science: Practice and Experiences (WSSSPE4)*, Gabrielle Allen, Jeffrey Carver, Sou-Cheng T. Choi, et al., editors, volume 1686, CEUR Workshop Proceedings, 2016.
- [64] Jack Dongarra, Sven Hammarling, Nicholas J. Higham, Samuel D. Relton, Pedro Valero-Lara, and Mawussi Zounon. [The design and performance of batched BLAS on modern high-performance computing systems](#). *Procedia Computer Science*, 108:495–504, 2017.
- [65] Jack Dongarra, Sven Hammarling, Nicholas J. Higham, Samuel D. Relton, and Mawussi Zounon. [Optimized batched linear algebra for modern architectures](#). In *Euro-Par 2017: Parallel Processing*, Francisco F. Rivera, Tomás F. Pena, and José C. Cabaleiro, editors, volume 10417 of *Lecture Notes in Computer Science*, Springer-Verlag, Cham, Switzerland, 2017, pages 511–522.
- [66] Jeremy J. Du Croz and Nicholas J. Higham. [Stability of methods for matrix inversion](#). *IMA J. Numer. Anal.*, 12:1–19, 1992.



- [67] Massimiliano Fasi and Nicholas J. Higham. [Multiprecision algorithms for computing the matrix logarithm](#). *SIAM J. Matrix Anal. Appl.*, 39(1):472–491, 2018.
- [68] Massimiliano Fasi and Nicholas J. Higham. [An arbitrary precision scaling and squaring algorithm for the matrix exponential](#). *SIAM J. Matrix Anal. Appl.*, 40(4):1233–1256, 2019.
- [69] Massimiliano Fasi and Nicholas J. Higham. [Generating extreme-scale matrices with specified singular values or condition numbers](#). MIMS EPrint 2020.8, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, March 2020. 21 pp. Revised October 2020. To appear in SIAM J. Sci. Comput.
- [70] Massimiliano Fasi and Nicholas J. Higham. [Matrices with tunable infinity-norm condition number and no need for pivoting in LU factorization](#). MIMS EPrint 2020.17, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, July 2020. 19 pp. Revised December 2020. To appear in SIAM J. Matrix Anal. Appl.
- [71] Massimiliano Fasi, Nicholas J. Higham, and Bruno Iannazzo. [An algorithm for the matrix Lambert  \$W\$  function](#). *SIAM J. Matrix Anal. Appl.*, 36(2):669–685, 2015.
- [72] Massimiliano Fasi, Nicholas J. Higham, Mantas Mikaitis, and Srikanth Praneeth. [Numerical behavior of NVIDIA tensor cores](#). MIMS EPrint 2020.10, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, April 2020. 15 pp. Revised October 2020. To appear in PeerJ Comput. Sci.
- [73] T. L. Freeman and Nicholas J. Higham. Joan E. Walsh (1932–2017). *Mathematics Today*, 2018.
- [74] Dan I. Georgescu. [Professor Nick Higham: Northern light](#). *The Actuary*, pages 12–14, 2020. Also at <https://www.theactuary.com/archive/2020/2020/06/03/june-2020-digital-issue>.
- [75] Dan I. Georgescu and Nicholas J. Higham. Completing correlation matrices. <https://bankunderground.co.uk/2018/02/01/completing-correlation-matrices/>, February 2018.

- [76] Dan I. Georgescu and Nicholas J. Higham. [Completing the matrix](#). *The Actuary*, pages 24–27, 2020. Also at <https://www.theactuary.com/issues/2020/11/november-2020>.
- [77] Dan I. Georgescu, Nicholas J. Higham, and Gareth W. Peters. [Explicit solutions to correlation matrix completion problems, with an application to risk management and insurance](#). *Roy. Soc. Open Sci.*, 5(3): 1–11, 2018.
- [78] Ivan Graham and Nicholas J. Higham. [UKIE applied/computational mathematicians greet the year in Sheffield, Manchester](#). *SIAM News*, 37(4):12, 2004.
- [79] Laurence Grammont, Nicholas J. Higham, and Françoise Tisseur. [A framework for analyzing nonlinear eigenproblems and parametrized linear systems](#). *Linear Algebra Appl.*, 435(3):623–640, 2011.
- [80] Chun-Hua Guo and Nicholas J. Higham. [A Schur–Newton method for the matrix  \$p\$ th root and its inverse](#). *SIAM J. Matrix Anal. Appl.*, 28(3):788–804, 2006.
- [81] Chun-Hua Guo and Nicholas J. Higham. [Iterative solution of a non-symmetric algebraic Riccati equation](#). *SIAM J. Matrix Anal. Appl.*, 29(2):396–412, 2007.
- [82] Chun-Hua Guo, Nicholas J. Higham, and Françoise Tisseur. [Detecting and solving hyperbolic quadratic eigenvalue problems](#). *SIAM J. Matrix Anal. Appl.*, 30(4):1593–1613, 2009.
- [83] Chun-Hua Guo, Nicholas J. Higham, and Françoise Tisseur. [An improved arc algorithm for detecting definite Hermitian pairs](#). *SIAM J. Matrix Anal. Appl.*, 31(3):1131–1151, 2009.
- [84] Azzam Haidar, Harun Bayraktar, Stanimire Tomov, Jack Dongarra, and Nicholas J. Higham. [Mixed-precision iterative refinement using tensor cores on GPUs to accelerate solution of linear systems](#). *Proc. Roy. Soc. London A*, 476(2243):20200110, 2020.
- [85] Azzam Haidar, Stanimire Tomov, Jack Dongarra, and Nicholas J. Higham. [Harnessing GPU tensor cores for fast FP16 arithmetic to speed up mixed-precision iterative refinement solvers](#). In *Proceedings of*

- the International Conference for High Performance Computing, Networking, Storage, and Analysis*, SC18 (Dallas, TX), Piscataway, NJ, USA, 2018, pages 47:1–47:11. IEEE Press.
- [86] Nicholas Hale, Nicholas J. Higham, and Lloyd N. Trefethen. [Computing  \$A^\alpha\$ ,  \$\log\(A\)\$ , and related matrix functions by contour integrals](#). *SIAM J. Numer. Anal.*, 46(5):2505–2523, 2008.
  - [87] Sven Hammarling and Nicholas J. Higham. [How to prepare a poster](#). *SIAM News*, 29(4):20, 19, 1996.
  - [88] Sven Hammarling and Nicholas J. Higham. Remembering James Hardy Wilkinson. <https://sinews.siam.org/Details-Page/remembering-james-hardy-wilkinson-1>, October 2016.
  - [89] Sven Hammarling and Nicholas J. Higham. Wilkinson and backward error analysis. <https://nla-group.org/2019/02/18/wilkinson-and-backward-error-analysis/>, February 2019.
  - [90] Sven Hammarling, Nicholas J. Higham, and Bo Kågström. CERFACS hosts workshop on reliability of computations. *SIAM News*, 26:4, 1993.
  - [91] Sven Hammarling, Nicholas J. Higham, and Craig Lucas. [LAPACK-style codes for pivoted Cholesky and QR updating](#). In *Applied Parallel Computing. State of the Art in Scientific Computing. 8th International Workshop, PARA 2006*, Bo Kågström, Erik Elmroth, Jack Dongarra, and Jerzy Waśniewski, editors, number 4699 in *Lecture Notes in Computer Science*, Springer-Verlag, Berlin, Germany, 2007, pages 137–146.
  - [92] Sven J. Hammarling and Nicholas J. Higham. Celebrating James Hardy Wilkinson. *Mathematics Today*, 55(4):131, 2019.
  - [93] Gareth I. Hargreaves and Nicholas J. Higham. [Efficient algorithms for the matrix cosine and sine](#). *Numer. Algorithms*, 40(4):383–400, 2005.
  - [94] Desmond J. Higham and Nicholas J. Higham. [Backward error and condition of structured linear systems](#). *SIAM J. Matrix Anal. Appl.*, 13(1):162–175, 1992.
  - [95] Desmond J. Higham and Nicholas J. Higham. [Componentwise perturbation theory for linear systems with multiple right-hand sides](#). *Linear Algebra Appl.*, 174:111–129, 1992.

- [96] Desmond J. Higham and Nicholas J. Higham. [Structured backward error and condition of generalized eigenvalue problems](#). *SIAM J. Matrix Anal. Appl.*, 20(2):493–512, 1998.
- [97] Desmond J. Higham and Nicholas J. Higham. *MATLAB Guide*. Society for Industrial and Applied Mathematics, Philadelphia, PA, USA, 2000. xxii+283 pp. ISBN 0-89871-516-4.
- [98] Desmond J. Higham and Nicholas J. Higham. *MATLAB Guide*. Second edition, Society for Industrial and Applied Mathematics, Philadelphia, PA, USA, 2005. xxiii+382 pp. ISBN 0-89871-578-4.
- [99] Desmond J. Higham and Nicholas J. Higham. *MATLAB Guide*. Second edition, A-Jin Publishing Company, Koea, 2006. 450 pp. Korean edition of [98]. ISBN 89-5761-168-1.
- [100] Desmond J. Higham and Nicholas J. Higham. *MATLAB Guide*. Third edition, Society for Industrial and Applied Mathematics, Philadelphia, PA, USA, 2017. xxvi+476 pp. ISBN 978-1-61197-465-2.
- [101] Desmond J. Higham, Nicholas J. Higham, and Srikara Pranesh. [Random matrices generating large growth in LU factorization with pivoting](#). *SIAM J. Matrix Anal. Appl.*, 42(1):185–201, 2021.
- [102] N. J. Higham. [Matrix condition numbers](#). M.Sc. Thesis, University of Manchester, Manchester, England, October 1983. iv+86 pp.
- [103] Nicholas J. Higham. The Matrix Computation Toolbox. <http://www.maths.manchester.ac.uk/~higham/mctoolbox>.
- [104] Nicholas J. Higham. The Matrix Function Toolbox. <http://www.maths.manchester.ac.uk/~higham/mftoolbox>.
- [105] Nicholas J. Higham. Upper bounds for the condition number of a triangular matrix. Numerical Analysis Report No. 86, University of Manchester, Manchester, England, May 1983.
- [106] Nicholas J. Higham. [Matrix computations in Basic on a microcomputer](#). Numerical Analysis Report No. 101, Department of Mathematics, University of Manchester, Manchester, M13 9PL, UK, June 1985. 62 pp. Reissued as MIMS EPrint 2013.51, Manchester Institute for

Mathematical Sciences, The University of Manchester, UK, October 2013.

- [107] Nicholas J. Higham. [Nearness Problems in Numerical Linear Algebra](#). PhD thesis, University of Manchester, Manchester, England, July 1985. 173 pp.
- [108] Nicholas J. Higham. [Computing the polar decomposition—with applications](#). *SIAM J. Sci. Statist. Comput.*, 7(4):1160–1174, 1986.
- [109] Nicholas J. Higham. [Efficient algorithms for computing the condition number of a tridiagonal matrix](#). *SIAM J. Sci. Statist. Comput.*, 7(1):150–165, 1986.
- [110] Nicholas J. Higham. Matrix computations in Basic on a microcomputer. *IMA Bulletin*, 22(1/2):13–20, 1986.
- [111] Nicholas J. Higham. [Newton’s method for the matrix square root](#). *Math. Comp.*, 46(174):537–549, 1986.
- [112] Nicholas J. Higham. [Computing real square roots of a real matrix](#). *Linear Algebra Appl.*, 88/89:405–430, 1987.
- [113] Nicholas J. Higham. [Error analysis of the Björck-Pereyra algorithms for solving Vandermonde systems](#). *Numer. Math.*, 50(5):613–632, 1987.
- [114] Nicholas J. Higham. [A survey of condition number estimation for triangular matrices](#). *SIAM Rev.*, 29(4):575–596, 1987.
- [115] Nicholas J. Higham. [Computing a nearest symmetric positive semidefinite matrix](#). *Linear Algebra Appl.*, 103:103–118, 1988.
- [116] Nicholas J. Higham. [Fast solution of Vandermonde-like systems involving orthogonal polynomials](#). *IMA J. Numer. Anal.*, 8:473–486, 1988.
- [117] Nicholas J. Higham. [FORTRAN codes for estimating the one-norm of a real or complex matrix, with applications to condition estimation \(Algorithm 674\)](#). *ACM Trans. Math. Software*, 14(4):381–396, 1988.
- [118] Nicholas J. Higham. [The symmetric Procrustes problem](#). *BIT*, 28:133–143, 1988.

- [119] Nicholas J. Higham. [The accuracy of solutions to triangular systems.](#) *SIAM J. Numer. Anal.*, 26(5):1252–1265, 1989.
- [120] Nicholas J. Higham. A collection of test matrices in MATLAB. Numerical Analysis Report No. 172, University of Manchester, Manchester, England, July 1989.
- [121] Nicholas J. Higham. Matrix computations on a PC. *SIAM News*, 22:16, 1989.
- [122] Nicholas J. Higham. Matrix computations on a PC (review of GAUSS and PC-MATLAB). *SIAM News*, 22(1):16, 1989.
- [123] Nicholas J. Higham. Matrix nearness problems and applications. In *Applications of Matrix Theory*, M. J. C. Gover and S. Barnett, editors, Oxford University Press, 1989, pages 1–27.
- [124] Nicholas J. Higham. Analysis of the Cholesky decomposition of a semi-definite matrix. In *Reliable Numerical Computation*, M. G. Cox and S. J. Hammarling, editors, Oxford University Press, 1990, pages 161–185.
- [125] Nicholas J. Higham. [Bounding the error in Gaussian elimination for tridiagonal systems.](#) *SIAM J. Matrix Anal. Appl.*, 11(4):521–530, 1990.
- [126] Nicholas J. Higham. Computing error bounds for regression problems. In *Statistical Analysis of Measurement Error Models and Applications, Contemporary Mathematics 112*, Philip J. Brown and Wayne A. Fuller, editors, American Mathematical Society, Providence, RI, USA, 1990, pages 195–208.
- [127] Nicholas J. Higham. [Experience with a matrix norm estimator.](#) *SIAM J. Sci. Statist. Comput.*, 11(4):804–809, 1990.
- [128] Nicholas J. Higham. [Exploiting fast matrix multiplication within the level 3 BLAS.](#) *ACM Trans. Math. Software*, 16(4):352–368, 1990.
- [129] Nicholas J. Higham. How accurate is Gaussian elimination? In *Numerical Analysis 1989, Proceedings of the 13th Dundee Conference*, D. F. Griffiths and G. A. Watson, editors, volume 228 of *Pitman Research Notes in Mathematics*, Longman Scientific and Technical, Essex, UK, 1990, pages 137–154.

- [130] Nicholas J. Higham. Is fast matrix multiplication of practical use? *SIAM News*, 23:12+, 1990.
- [131] Nicholas J. Higham. Iterative refinement enhances the stability of  $QR$  factorization methods for solving linear equations. Numerical Analysis Report No. 182, University of Manchester, Manchester, England, April 1990.
- [132] Nicholas J. Higham. MATLAB: A tool for teaching and research. *Mathematics and Statistics Newsletter of Computers in Teaching Initiative*, 1(1):4–8, 1990.
- [133] Nicholas J. Higham. [Review of “G. H. Golub and C. F. Van Loan, Matrix Computations, Second Edition, Johns Hopkins University Press, Baltimore, Maryland, 1989”](#). *Linear Algebra Appl.*, 141:289–292, 1990.
- [134] Nicholas J. Higham. [Review of “M. J. C. Gover and S. Barnett, eds., Applications of Matrix Theory, Oxford University Press, 1989”](#). *The Mathematical Gazette*, 74(468):202, 1990.
- [135] Nicholas J. Higham. [Stability analysis of algorithms for solving confluent Vandermonde-like systems](#). *SIAM J. Matrix Anal. Appl.*, 11(1): 23–41, 1990.
- [136] Nicholas J. Higham. [Algorithm 694: A collection of test matrices in MATLAB](#). *ACM Trans. Math. Software*, 17(3):289–305, 1991.
- [137] Nicholas J. Higham. Complete pivoting conjecture is disproved. *SIAM News*, 24:9, 1991.
- [138] Nicholas J. Higham. [Iterative refinement enhances the stability of  \$QR\$  factorization methods for solving linear equations](#). *BIT*, 31:447–468, 1991.
- [139] Nicholas J. Higham. SIAM holds fourth applied linear algebra conference. *SIAM News*, 24:10, 1991.
- [140] Nicholas J. Higham. Solving linear equations. In *New Applications of Mathematics*, Christine Bondi, editor, Penguin, London, 1991, pages 33–56.

- [141] Nicholas J. Higham. Three measures of precision in floating point arithmetic. *NA Digest*, Volume 91, Issue 16, 1991. Electronic mail magazine: [na.help@na-net.ornl.gov](mailto:na.help@na-net.ornl.gov).
- [142] Nicholas J. Higham. [Estimating the matrix  \$p\$ -norm](#). *Numer. Math.*, 62:539–555, 1992.
- [143] Nicholas J. Higham. IMA workshop participants fête Golub on 60th birthday. *SIAM News*, 25:3, 32, 1992.
- [144] Nicholas J. Higham. The joy of anonymous FTP. *IMA Numerical Analysis Newsletter*, 17(1):61–64, 1992.
- [145] Nicholas J. Higham. LAPACK released in March. *SIAM News*, 25:20, 1992.
- [146] Nicholas J. Higham. [Stability of a method for multiplying complex matrices with three real matrix multiplications](#). *SIAM J. Matrix Anal. Appl.*, 13(3):681–687, 1992.
- [147] Nicholas J. Higham. [The accuracy of floating point summation](#). *SIAM J. Sci. Comput.*, 14(4):783–799, 1993.
- [148] Nicholas J. Higham. *Handbook of Writing for the Mathematical Sciences*. Society for Industrial and Applied Mathematics, Philadelphia, PA, USA, 1993. xii+241 pp. ISBN 0-89871-314-5.
- [149] Nicholas J. Higham. [Optimization by direct search in matrix computations](#). *SIAM J. Matrix Anal. Appl.*, 14(2):317–333, 1993.
- [150] Nicholas J. Higham. [Perturbation theory and backward error for  \$AX - XB = C\$](#) . *BIT*, 33:124–136, 1993.
- [151] Nicholas J. Higham. The Test Matrix Toolbox for MATLAB. Numerical Analysis Report No. 237, Manchester Centre for Computational Mathematics, UK, December 1993. 76 pp.
- [152] Nicholas J. Higham.  $\text{\LaTeX}$ : A versatile tool for  $\text{\LaTeX}$  users. *SIAM News*, 27:10, 11, 19, 1994.



- [153] Nicholas J. Higham. *Handbook of Writing for the Mathematical Sciences*. Nippon Hyoron Sha, Tokyo, 1994. x+235 pp. Japanese edition of [148], translated by Shoji Okumura and Takemitsu Hasegawa. ISBN 4-535-78211-3.
- [154] Nicholas J. Higham. [The matrix sign decomposition and its relation to the polar decomposition](#). *Linear Algebra Appl.*, 212/213:3–20, 1994.
- [155] Nicholas J. Higham. A survey of componentwise perturbation theory in numerical linear algebra. In *Mathematics of Computation 1943–1993: A Half Century of Computational Mathematics*, Walter Gautschi, editor, volume 48 of *Proceedings of Symposia in Applied Mathematics*, American Mathematical Society, Providence, RI, USA, 1994, pages 49–77.
- [156] Nicholas J. Higham. Which dictionary for the mathematical scientist? *IMA Bulletin*, 30(5/6):81–88, 1994.
- [157] Nicholas J. Higham. Manchester hosts linear algebra conference. *SIAM News*, 28:4, 18, 1995.
- [158] Nicholas J. Higham. Review of “Howard Anton and Chris Rorres, Elementary Linear Algebra: Applications Version, Seventh edition, Wiley, New York, 1994.”. *IMA Bulletin*, 31(7/8):122–123, 1995.
- [159] Nicholas J. Higham. [Stability of parallel triangular system solvers](#). *SIAM J. Sci. Comput.*, 16(2):400–413, 1995.
- [160] Nicholas J. Higham. [The Test Matrix Toolbox for MATLAB \(version 3.0\)](#). Numerical Analysis Report No. 276, Manchester Centre for Computational Mathematics, UK, September 1995. 70 pp.
- [161] Nicholas J. Higham. *Accuracy and Stability of Numerical Algorithms*. Society for Industrial and Applied Mathematics, Philadelphia, PA, USA, 1996. xxviii+688 pp. ISBN 0-89871-355-2.
- [162] Nicholas J. Higham. *Accuracy and Stability of Numerical Algorithms*. Society for Industrial and Applied Mathematics, Philadelphia, PA, USA, 1996. xxviii+688 pp. ISBN 0-89871-355-2.

- [163] Nicholas J. Higham. Review of “Acta Numerica 1994 and Acta Numerica 1995, Cambridge University Press”. *Mathematics Today*, 32(1/2): 28, 1996.
- [164] Nicholas J. Higham. Review of “Are Magnus Bruaset, A Survey of Preconditioned Iterative Methods, volume 328 of Pitman Research Notes in Mathematics. Longman Scientific and Technical, Essex, UK, 1995.”. *IMA Bulletin*, 32(3/4):60, 1996.
- [165] Nicholas J. Higham. [Review of “Dario Bini and Victor Y. Pan, \*Polynomial and Matrix Computations. Volume 1: Fundamental Algorithms\*, Birkhäuser, 1994”](#). *Math. Comp.*, 65(214):888–889, 1996.
- [166] Nicholas J. Higham. [Iterative refinement for linear systems and LAPACK](#). *IMA J. Numer. Anal.*, 17(4):495–509, 1997.
- [167] Nicholas J. Higham. Manchester hosts inaugural meeting of UK and Irish SIAM Section. *SIAM News*, 30(3):3, 1997.
- [168] Nicholas J. Higham. Recent developments in dense numerical linear algebra. In *The State of the Art in Numerical Analysis*, I. S. Duff and G. A. Watson, editors, Oxford University Press, 1997, pages 1–26.
- [169] Nicholas J. Higham. Review of “James R. Schott, Matrix Analysis for Statistics, Wiley, 1997”. *Mathematics Today*, 33(5):161–162, 1997.
- [170] Nicholas J. Higham. [Stability of the diagonal pivoting method with partial pivoting](#). *SIAM J. Matrix Anal. Appl.*, 18(1):52–65, 1997.
- [171] Nicholas J. Higham. [Stable iterations for the matrix square root](#). *Numer. Algorithms*, 15(2):227–242, 1997.
- [172] Nicholas J. Higham. Testing linear algebra software. In *Quality of Numerical Software: Assessment and Enhancement*, Ronald F. Boisvert, editor, Chapman and Hall, London, 1997, pages 109–122.
- [173] Nicholas J. Higham. Commentary on Lanczos’s “Introduction” to the “Tables of Chebyshev Polynomials  $S_n(x)$  and  $C_n(x)$ ”. In *Cornelius Lanczos Collected Published Papers with Commentaries*, William R. Davis et al., editors, volume VI, North Carolina State University, Raleigh, NC 27695-8202, USA, 1998, pages 3:557–3:559.

- [174] Nicholas J. Higham. [Factorizing complex symmetric matrices with positive definite real and imaginary parts](#). *Math. Comp.*, 67(224):1591–1599, 1998.
- [175] Nicholas J. Higham. [Handbook of Writing for the Mathematical Sciences](#). Second edition, Society for Industrial and Applied Mathematics, Philadelphia, PA, USA, 1998. xvi+302 pp. ISBN 978-0-898714-20-3.
- [176] Nicholas J. Higham. Review of “Christoph W. Ueberhuber, Numerical Computation: Methods, Software and Analysis, Springer-Verlag, 1997”. *Computational Science and Engineering*, 5(1):79, 1998.
- [177] Nicholas J. Higham. [Featured book review: Selected books on numerical linear algebra](#). *SIAM Rev.*, 41(3):607–610, 1999.
- [178] Nicholas J. Higham. [A fitting tribute to a pioneering numerical analyst \[Cleve Moler\]](#). *SIAM News*, 32(10):3, 1999.
- [179] Nicholas J. Higham. A new `sqrtn` for MATLAB. Numerical Analysis Report No. 336, Manchester Centre for Computational Mathematics, UK, January 1999. 11 pp.
- [180] Nicholas J. Higham. Notes on accuracy and stability of algorithms in numerical linear algebra. In *The Graduate Student’s Guide to Numerical Analysis ’98*, Mark Ainsworth, Jeremy Levesley, and Marco Marletta, editors, Springer-Verlag, Berlin, Germany, 1999, pages 48–82.
- [181] Nicholas J. Higham. Review of “Peter D. Lax, Linear Algebra, Wiley, 1997”. *Bull. London Math. Soc.*, 31:374–375, 1999.
- [182] Nicholas J. Higham. [Stability of block LDL<sup>T</sup> factorization of a symmetric tridiagonal matrix](#). *Linear Algebra Appl.*, 287:181–189, 1999.
- [183] Nicholas J. Higham. [QR factorization with complete pivoting and accurate computation of the SVD](#). *Linear Algebra Appl.*, 309:153–174, 2000.
- [184] Nicholas J. Higham. Review of “Jack J. Dongarra, Iain S. Duff, Danny C. Sorensen, and Henk A. van der Vorst, Numerical Linear Algebra for High-Performance Computers, Society for Industrial and

- [Applied Mathematics, Philadelphia, PA, USA, 1998](#)". *SIAM Rev.*, 42(3):529, 2000.
- [185] Nicholas J. Higham. [Evaluating Padé approximants of the matrix logarithm](#). *SIAM J. Matrix Anal. Appl.*, 22(4):1126–1135, 2001.
  - [186] Nicholas J. Higham. [Review of “Michael Alley, The Craft of Editing: A Guide for Managers, Scientists and Engineers. Springer-Verlag, 2000”](#). *SIAM Rev.*, 43(1):202, 2001.
  - [187] Nicholas J. Higham. [Accuracy and Stability of Numerical Algorithms](#). Second edition, Society for Industrial and Applied Mathematics, Philadelphia, PA, USA, 2002. xxx+680 pp. ISBN 0-89871-521-0.
  - [188] Nicholas J. Higham. [Cholesky factorization](#). In *Encyclopedia of Mathematics*, Springer-Verlag, Berlin, Germany, 2002, pages 863–865.
  - [189] Nicholas J. Higham. [Computing the nearest correlation matrix—A problem from finance](#). *IMA J. Numer. Anal.*, 22(3):329–343, 2002.
  - [190] Nicholas J. Higham. The Matrix Computation Toolbox for MATLAB (version 1.0). Numerical Analysis Report No. 410, Manchester Centre for Computational Mathematics, UK, August 2002. 19 pp.
  - [191] Nicholas J. Higham. [Review of “Arnold Neumaier. Introduction to Numerical Analysis. Cambridge University Press, 2001”](#). *SIAM Rev.*, 44(3):492–493, 2002.
  - [192] Nicholas J. Higham. [Review of “Michael Overton, Numerical Computing with IEEE Floating Point Arithmetic: Including One Theorem, One Rule of Thumb, and One Hundred and One Exercises. Society for Industrial and Applied Mathematics, Philadelphia, PA, USA, 2001”](#). *SIAM Rev.*, 44(2):287–288, 2002.
  - [193] Nicholas J. Higham. [J-orthogonal matrices: Properties and generation](#). *SIAM Rev.*, 45(3):504–519, 2003.
  - [194] Nicholas J. Higham. [SIAG/LA prizewinners speed up the QR algorithm](#). *SIAM News*, 36(9):3, 2003.
  - [195] Nicholas J. Higham. [The numerical stability of barycentric Lagrange interpolation](#). *IMA J. Numer. Anal.*, 24(4):547–556, 2004.

- [196] Nicholas J. Higham. [An interview with Peter Lancaster](#). Numerical Analysis Report No. 468, Manchester Centre for Computational Mathematics, UK, June 2005. 10 pp.
- [197] Nicholas J. Higham. [An interview with Peter Lancaster](#). *SIAM News*, 38(6):5–6, 2005.
- [198] Nicholas J. Higham. [Review of “Folkmar Bornemann, Dirk Laurie, Stan Wagon, and Jörg Waldvogel. The SIAM 100-Digit Challenge: A Study in High-Accuracy Numerical Computing, 2004”](#). *SIAM Rev.*, 47(2):382–383, 2005.
- [199] Nicholas J. Higham. [The scaling and squaring method for the matrix exponential revisited](#). *SIAM J. Matrix Anal. Appl.*, 26(4):1179–1193, 2005.
- [200] Nicholas J. Higham. Functions of matrices. In *Handbook of Linear Algebra*, Leslie Hogben, editor, Chapman and Hall/CRC, Boca Raton, FL, USA, 2006, pages 11.1–11.13.
- [201] Nicholas J. Higham. [Review of “Alan J. Laub. \*Matrix Analysis for Scientists and Engineers\*”](#). *SIAM Rev.*, 48(1):170–171, 2006.
- [202] Nicholas J. Higham. [Review of “Moody T. Chu and Gene H. Golub. \*Inverse Eigenvalue Problems: Theory, Algorithms, and Applications\*”](#). *J. Fluid Mech.*, 556:442–443, 2006.
- [203] Nicholas J. Higham. Commentary on matrix factorizations and applications. In *Milestones in Matrix Computation: The Selected Works of Gene H. Golub, with Commentaries*, Raymond H. Chan, Chen Greif, and Dianne P. O’Leary, editors, Oxford University Press, 2007, pages 227–235.
- [204] Nicholas J. Higham. [Review of “Lloyd N. Trefethen and Mark Embree. \*Spectra and Pseudospectra: The Behavior of Nonnormal Matrices and Operators\*”](#). *Bull. Amer. Math. Soc.*, 44(2):277–284, 2007.
- [205] Nicholas J. Higham. [Cayley, Sylvester, and early matrix theory](#). *Linear Algebra Appl.*, 428:39–43, 2008.

- [206] Nicholas J. Higham. *Functions of Matrices: Theory and Computation*. Society for Industrial and Applied Mathematics, Philadelphia, PA, USA, 2008. xx+425 pp. ISBN 978-0-898716-46-7.
- [207] Nicholas J. Higham. [In his own words \[interview with Gene Golub\]](#). *SIAM News*, 41(1):3, 2008. Extracts from [208].
- [208] Nicholas J. Higham. [An interview with Gene Golub](#). MIMS EPrint 2008.8, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, February 2008. 13 pp.
- [209] Nicholas J. Higham. [Cholesky factorization](#). *WIREs Comp. Stat.*, 1(2):251–254, 2009.
- [210] Nicholas J. Higham. [The scaling and squaring method for the matrix exponential revisited](#). *SIAM Rev.*, 51(4):747–764, 2009.
- [211] Nicholas J. Higham. [Gaussian elimination](#). *WIREs Comp. Stat.*, 3(3):230–238, 2011.
- [212] Nicholas J. Higham. Arthur Buchheim (1859–1888). <http://nhigham.com/2013/01/31/arthur-buchheim>, January 2013.
- [213] Nicholas J. Higham. Gene Golub SIAM Summer School 2013. <http://nhigham.com/2013/08/09/gene-golub-siam-summer-school-2013>, August 2013.
- [214] Nicholas J. Higham. The nearest correlation matrix. <https://nhigham.com/2013/02/13/the-nearest-correlation-matrix>, February 2013.
- [215] Nicholas J. Higham. Why to nominate for prizes. <http://blogs.siam.org/why-to-nominate-for-prizes>, December 2013.
- [216] Nicholas J. Higham. A call for better indexes. <https://sinews.siam.org/Details-Page/a-call-for-better-indexes>, November 2014.
- [217] Nicholas J. Higham. Confessions of a vice president at large. <http://blogs.siam.org/confessions-of-a-vice-president-at-large>, January 2014.

- [218] Nicholas J. Higham. Functions of matrices. In *Handbook of Linear Algebra*, Leslie Hogben, editor, second edition, Chapman and Hall/CRC, Boca Raton, FL, USA, 2014, pages 17.1–17.15.
- [219] Nicholas J. Higham. Making sense of multivalued matrix functions with the matrix unwinding function. <https://nhigham.com/2014/03/24/making-sense-of-multivalued-matrix-functions>, March 2014.
- [220] Nicholas J. Higham. Numerical conditioning. In *Walter Gautschi. Selected Works with Commentaries*, Claude Brezinski and Ahmed Sameh, editors, volume 1, Birkhäuser, New York, 2014, pages 37–40.
- [221] Nicholas J. Higham. The spotlight factor. <https://nhigham.com/2014/09/10/the-spotlight-factor>, September 2014.
- [222] Nicholas J. Higham. Sylvester’s influence on applied mathematics. *Mathematics Today*, 50(4):202–206, 2014.
- [223] Nicholas J. Higham. Algorithms. In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 40–49.
- [224] Nicholas J. Higham. Color spaces and digital imaging. In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 808–813.
- [225] Nicholas J. Higham. Floating-point arithmetic. In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 96–97.
- [226] Nicholas J. Higham. Functions of matrices. In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 97–99.

- [227] Nicholas J. Higham. Goals of applied mathematical research. In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 48–55.
- [228] Nicholas J. Higham. How to read and understand a paper. In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 903–906.
- [229] Nicholas J. Higham. The Jordan canonical form. In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 112–113.
- [230] Nicholas J. Higham. The language of applied mathematics. In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 8–27.
- [231] Nicholas J. Higham. [Making the Princeton Companion to Applied Mathematics](#). *Mathematics Today*, 51(5):212–214, 2015.
- [232] Nicholas J. Higham. [Matrix functions: Computation](#). In *Encyclopedia of Applied and Computational Mathematics*, Björn Engquist, editor, Springer-Verlag, Berlin, Germany, 2015, pages 863–865.
- [233] Nicholas J. Higham. Methods of solution. In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 27–40.
- [234] Nicholas J. Higham. Numerical linear algebra and matrix analysis. In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil



Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 263–281.

- [235] Nicholas J. Higham. Programming languages: An applied mathematics view. In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 828–839.
- [236] Nicholas J. Higham. The singular value decomposition. In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 126–127.
- [237] Nicholas J. Higham. The Sylvester and Lyapunov equations. In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 168–169.
- [238] Nicholas J. Higham. What is applied mathematics? In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 1–8.
- [239] Nicholas J. Higham. Workflow. In *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors, Princeton University Press, Princeton, NJ, USA, 2015, pages 912–916.
- [240] Nicholas J. Higham. [Cambridge hosts 20th anniversary meeting of UKIE SIAM Section](#). *SIAM News*, 49(2):10, 2016.
- [241] Nicholas J. Higham. Distraction-free editing with Emacs. <https://nhigham.com/2016/01/14/distraction-free-editing-with-emacs>, January 2016.

- [242] Nicholas J. Higham. Improved MATLAB function Sqrtm. <https://nhigham.com/2016/04/05/improved-matlab-function-sqrtm>, April 2016.
- [243] Nicholas J. Higham. The improved MATLAB functions Expm and Logm. <https://nhigham.com/2016/03/08/the-improved-matlab-functions-expm-and-logm>, March 2016.
- [244] Nicholas J. Higham. Iterating MATLAB commands. <https://nhigham.com/2016/05/13/iterating-matlab-commands>, May 2016.
- [245] Nicholas J. Higham. Knuth gives satisfaction in SIAM von Neumann Lecture. <https://sinews.siam.org/Details-Page/knuth-gives-satisfaction-in-siam-von-neumann-lecture-1>, July 2016.
- [246] Nicholas J. Higham. [Mixed precision computations](#). In *New Directions in Numerical Computation*, Tobin A. Driscoll, Endre Süli, and Alex Townsend, editors, volume 63, Notices Amer. Math. Soc., 2016, pages 398–400.
- [247] Nicholas J. Higham. The one-line maze program in MATLAB. <https://nhigham.com/2016/06/29/the-one-line-maze-program-in-matlab>, June 2016.
- [248] Nicholas J. Higham. Preparing CMYK figures for book printing. <https://nhigham.com/2017/02/06/preparing-cmyk-figures-for-book-printing/>, June 2016.
- [249] Nicholas J. Higham. The top 10 algorithms in applied mathematics. <https://nhigham.com/2016/03/29/the-top-10-algorithms-in-applied-mathematics>, March 2016.
- [250] Nicholas J. Higham. [Behind the scenes of SIAM’s prize program](#). *SIAM News*, 50(5):2, 2017.
- [251] Nicholas J. Higham. [The evolution of mathematical word processing](#). *SIAM News*, 50(6):2, 4, 2017.
- [252] Nicholas J. Higham. [Evolving and innovating](#). *SIAM News*, 50(1):2, 2017.

- [253] Nicholas J. Higham. [In search of the perfect numerical analysis textbook](#). *SIAM News*, 50(4):2, 2017.
- [254] Nicholas J. Higham. [A multiprecision world](#). *SIAM News*, 50(8):2, 2017.
- [255] Nicholas J. Higham. [ORCID: A self-updating digital CV](#). *SIAM News*, 50(9):2, 2017.
- [256] Nicholas J. Higham. [Short codes can be long on insight](#). *SIAM News*, 50(3):2–3, 2017.
- [257] Nicholas J. Higham. [Telling a good story at conferences](#). *SIAM News*, 50(2):2, 2017.
- [258] Nicholas J. Higham. [There’s something about yellow](#). *SIAM News*, 50(7):2, 2017.
- [259] Nicholas J. Higham. [The world’s most fundamental matrix equation](#). *SIAM News*, 50(10):2, 2017.
- [260] Nicholas J. Higham. [Advancing SIAM](#). *SIAM News*, 51(6):2, 2018.
- [261] Nicholas J. Higham. [Differentiation with\(out\) a difference](#). *SIAM News*, 51(5):2, 2018.
- [262] Nicholas J. Higham. [Exploring the new SIAM website](#). *SIAM News*, 51(7):2, 2018.
- [263] Nicholas J. Higham. [It’s a matter of style](#). *SIAM News*, 51(2):2, 2018.
- [264] Nicholas J. Higham. [Looking back at 60 volumes of \*SIAM Review\*](#). *SIAM News*, 51(3):2, 5, 2018.
- [265] Nicholas J. Higham. [Rhapsodizing about Bohemian matrices](#). *SIAM News*, 51(10):2, 2018.
- [266] Nicholas J. Higham. [Snap to structure](#). *SIAM News*, 51(1):2, 2018.
- [267] Nicholas J. Higham. [A timely focus on data science](#). *SIAM News*, 51(9):2, 2018.

- [268] Nicholas J. Higham. [The unwinding number](#). *SIAM News*, 51(8):2, 2018.
- [269] Nicholas J. Higham. [Why to write a book](#). *SIAM News*, 51(4):2, 2018.
- [270] Nicholas J. Higham. [Error analysis for standard and GMRES-based iterative refinement in two and three-precisions](#). MIMS EPrint 2019.19, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, November 2019. 8 pp.
- [271] Nicholas J. Higham. [Pitfalls in computation](#). *SIAM News*, 52(10):7, 2019.
- [272] Nicholas J. Higham. *Handbook of Writing for the Mathematical Sciences*. Third edition, Society for Industrial and Applied Mathematics, Philadelphia, PA, USA, 2020. xxi+353 pp. ISBN 978-1-611976-09-0.
- [273] Nicholas J. Higham and Awad H. Al-Mohy. [Computing matrix functions](#). *Acta Numerica*, 19:159–208, 2010.
- [274] Nicholas J. Higham and Sheung Hun Cheng. [Modifying the inertia of matrices arising in optimization](#). *Linear Algebra Appl.*, 275–276: 261–279, 1998.
- [275] Nicholas J. Higham and Edwin Deadman. [A catalogue of software for matrix functions. Version 1.0](#). MIMS EPrint 2014.8, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, February 2014. 19 pp.
- [276] Nicholas J. Higham and Edwin Deadman. [A catalogue of software for matrix functions. Version 2.0](#). MIMS EPrint 2016.3, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, January 2016. 22 pp. Updated March 2016.
- [277] Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors. [The Princeton Companion to Applied Mathematics](#). Princeton University Press, Princeton, NJ, USA, 2015. xvii + 994 + 16 color plates pp. ISBN 978-0-691-15039-0.

- [278] Nicholas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa, and Jared Tanner, editors. *The Princeton Companion to Applied Mathematics*. Seung San Publishers, South Korea, 2018. 936 + 16 color plates + 639 pp. Korean translation of [277], in two volumes. ISBN 978-89-6139-069-9 and 978-89-6139-070-5.
- [279] Nicholas J. Higham and Neville J. Ford. Christopher T. H. Baker (1939–2017). *Mathematics Today*, 2017.
- [280] Nicholas J. Higham and Desmond J. Higham. [Large growth factors in Gaussian elimination with pivoting](#). *SIAM J. Matrix Anal. Appl.*, 10(2):155–164, 1989.
- [281] Nicholas J. Higham and Edvin Hopkins. [A catalogue of software for matrix functions. Version 3.0](#). MIMS EPrint 2020.7, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, March 2020. 24 pp.
- [282] Nicholas J. Higham and Peter Kandolf. [Computing the action of trigonometric and hyperbolic matrix functions](#). *SIAM J. Sci. Comput.*, 39(2):A613–A627, 2017.
- [283] Nicholas J. Higham and Hyun-Min Kim. [Numerical analysis of a quadratic matrix equation](#). *IMA J. Numer. Anal.*, 20(4):499–519, 2000.
- [284] Nicholas J. Higham and Hyun-Min Kim. [Solving a quadratic matrix equation by Newton’s method with exact line searches](#). *SIAM J. Matrix Anal. Appl.*, 23(2):303–316, 2001.
- [285] Nicholas J. Higham and Philip A. Knight. [Componentwise error analysis for stationary iterative methods](#). In *Linear Algebra, Markov Chains, and Queueing Models*, Carl D. Meyer and Robert J. Plemmons, editors, volume 48 of *IMA Volumes in Mathematics and Its Applications*, Springer-Verlag, New York, 1993, pages 29–46.
- [286] Nicholas J. Higham and Philip A. Knight. [Finite precision behavior of stationary iteration for solving singular systems](#). *Linear Algebra Appl.*, 192:165–186, 1993.
- [287] Nicholas J. Higham and Philip A. Knight. [Matrix powers in finite precision arithmetic](#). *SIAM J. Matrix Anal. Appl.*, 16(2):343–358, 1995.

- [288] Nicholas J. Higham, Mihail Konstantinov, Volker Mehrmann, and Petko Petkov. [The sensitivity of computational control problems](#). *IEEE Control Systems Magazine*, 24(1):28–43, 2004.
- [289] Nicholas J. Higham, Ren-Cang Li, and Françoise Tisseur. [Backward error of polynomial eigenproblems solved by linearization](#). *SIAM J. Matrix Anal. Appl.*, 29(4):1218–1241, 2007.
- [290] Nicholas J. Higham and Lijing Lin. [On  \$p\$ th roots of stochastic matrices](#). *Linear Algebra Appl.*, 435(3):448–463, 2011.
- [291] Nicholas J. Higham and Lijing Lin. [A Schur–Padé algorithm for fractional powers of a matrix](#). *SIAM J. Matrix Anal. Appl.*, 32(3):1056–1078, 2011.
- [292] Nicholas J. Higham and Lijing Lin. [An improved Schur–Padé algorithm for fractional powers of a matrix and their Fréchet derivatives](#). *SIAM J. Matrix Anal. Appl.*, 34(3):1341–1360, 2013.
- [293] Nicholas J. Higham and Lijing Lin. [Matrix functions: A short course](#). In *Matrix Functions and Matrix Equations*, Zhaojun Bai, Weiguo Gao, and Yangfeng Su, editors, number 19 in *Series in Contemporary Applied Mathematics*, World Scientific, Singapore, 2015, pages 1–27.
- [294] Nicholas J. Higham and Xiaobo Liu. [A multiprecision derivative-free Schur–Parlett algorithm for computing matrix functions](#). MIMS EPrint 2020.19, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, September 2020. 21 pp.
- [295] Nicholas J. Higham, D. Steven Mackey, Niloufer Mackey, and Françoise Tisseur. [Computing the polar decomposition and the matrix sign decomposition in matrix groups](#). *SIAM J. Matrix Anal. Appl.*, 25(4):1178–1192, 2004.
- [296] Nicholas J. Higham, D. Steven Mackey, Niloufer Mackey, and Françoise Tisseur. [Functions preserving matrix groups and iterations for the matrix square root](#). *SIAM J. Matrix Anal. Appl.*, 26(3):849–877, 2005.
- [297] Nicholas J. Higham, D. Steven Mackey, Niloufer Mackey, and Françoise Tisseur. [Symmetric linearizations for matrix polynomials](#). *SIAM J. Matrix Anal. Appl.*, 29(1):143–159, 2006.

- [298] Nicholas J. Higham, D. Steven Mackey, and Françoise Tisseur. [The conditioning of linearizations of matrix polynomials](#). *SIAM J. Matrix Anal. Appl.*, 28(4):1005–1028, 2006.
- [299] Nicholas J. Higham, D. Steven Mackey, and Françoise Tisseur. [Definite matrix polynomials and their linearization by definite pencils](#). *SIAM J. Matrix Anal. Appl.*, 31(2):478–502, 2009.
- [300] Nicholas J. Higham, D. Steven Mackey, Françoise Tisseur, and Seamus D. Garvey. [Scaling, sensitivity and stability in the numerical solution of quadratic eigenvalue problems](#). *Internat. J. Numer. Methods Eng.*, 73(3):344–360, 2008.
- [301] Nicholas J. Higham and Theo Mary. [A new approach to probabilistic rounding error analysis](#). *SIAM J. Sci. Comput.*, 41(5):A2815–A2835, 2019.
- [302] Nicholas J. Higham and Theo Mary. [A new preconditioner that exploits low-rank approximations to factorization error](#). *SIAM J. Sci. Comput.*, 41(1):A59–A82, 2019.
- [303] Nicholas J. Higham and Theo Mary. [Solving block low-rank linear systems by LU factorization is numerically stable](#). MIMS EPrint 2019.15, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, September 2019. 26 pp. Revised January 2022.
- [304] Nicholas J. Higham and Theo Mary. [Sharper probabilistic backward error analysis for basic linear algebra kernels with random data](#). *SIAM J. Sci. Comput.*, 42(5):A3427–A3446, 2020.
- [305] Nicholas J. Higham, Christian Mehl, and Françoise Tisseur. [The canonical generalized polar decomposition](#). *SIAM J. Matrix Anal. Appl.*, 31(4):2163–2180, 2010.
- [306] Nicholas J. Higham, Gian Maria Negri Porzio, and Françoise Tisseur. [An updated set of nonlinear eigenvalue problems](#). MIMS EPrint 2019.5, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, March 2019. 12 pp.

- [307] Nicholas J. Higham and Vanni Noferini. [An algorithm to compute the polar decomposition of a  \$3 \times 3\$  matrix](#). *Numer. Algorithms*, 73(2): 349–369, 2016.
- [308] Nicholas J. Higham and Pythagoras Papadimitriou. Parallel singular value decomposition via the polar decomposition. Numerical Analysis Report No. 239, Manchester Centre for Computational Mathematics, UK, October 1993.
- [309] Nicholas J. Higham and Pythagoras Papadimitriou. A new parallel algorithm for computing the singular value decomposition. In *Proceedings of the Fifth SIAM Conference on Applied Linear Algebra*, John G. Lewis, editor, Society for Industrial and Applied Mathematics, Philadelphia, PA, USA, 1994, pages 80–84.
- [310] Nicholas J. Higham and Pythagoras Papadimitriou. [A parallel algorithm for computing the polar decomposition](#). *Parallel Comput.*, 20(8): 1161–1173, 1994.
- [311] Nicholas J. Higham and Alex Pothen. [Stability of the partitioned inverse method for parallel solution of sparse triangular systems](#). *SIAM J. Sci. Comput.*, 15(1):139–148, 1994.
- [312] Nicholas J. Higham and Srikara Pranesh. [Simulating low precision floating-point arithmetic](#). *SIAM J. Sci. Comput.*, 41(5):C585–C602, 2019.
- [313] Nicholas J. Higham and Srikara Pranesh. [Exploiting lower precision arithmetic in solving symmetric positive definite linear systems and least squares problems](#). *SIAM J. Sci. Comput.*, 43(1):A258–A277, 2021.
- [314] Nicholas J. Higham, Srikara Pranesh, and Mawussi Zounon. [Squeezing a matrix into half precision, with an application to solving linear systems](#). *SIAM J. Sci. Comput.*, 41(4):A2536–A2551, 2019.
- [315] Nicholas J. Higham and Samuel D. Relton. [Estimating the condition number of the Fréchet derivative of a matrix function](#). *SIAM J. Sci. Comput.*, 36(6):C617–C634, 2014.



- [316] Nicholas J. Higham and Samuel D. Relton. [Higher order Fréchet derivatives of matrix functions and the level-2 condition number](#). *SIAM J. Matrix Anal. Appl.*, 35(3):1019–1037, 2014.
- [317] Nicholas J. Higham and Samuel D. Relton. [Estimating the largest elements of a matrix](#). *SIAM J. Sci. Comput.*, 38(5):C584–C601, 2016.
- [318] Nicholas J. Higham and Robert S. Schreiber. [Fast polar decomposition of an arbitrary matrix](#). *SIAM J. Sci. Statist. Comput.*, 11(4):648–655, 1990.
- [319] Nicholas J. Higham and David J. Silvester. [“Nothing was Ever the Same Again”](#). *SIAM News*, 31(7):1,8, 1998.
- [320] Nicholas J. Higham and Matthew I. Smith. [Computing the matrix cosine](#). *Numer. Algorithms*, 34:13–26, 2003.
- [321] Nicholas J. Higham and G. W. Stewart. Numerical linear algebra in statistical computing. In *The State of the Art in Numerical Analysis*, A. Iserles and M. J. D. Powell, editors, Oxford University Press, 1987, pages 41–57.
- [322] Nicholas J. Higham and Nataša Strabić. [Anderson acceleration of the alternating projections method for computing the nearest correlation matrix](#). *Numer. Algorithms*, 72(4):1021–1042, 2016.
- [323] Nicholas J. Higham and Nataša Strabić. [Bounds for the distance to the nearest correlation matrix](#). *SIAM J. Matrix Anal. Appl.*, 37(3):1088–1102, 2016.
- [324] Nicholas J. Higham, Nataša Strabić, and Vedran Šego. [Restoring definiteness via shrinking, with an application to correlation matrices with a fixed block](#). *SIAM Rev.*, 58(2):245–263, 2016.
- [325] Nicholas J. Higham and Françoise Tisseur. [A block algorithm for matrix 1-norm estimation, with an application to 1-norm pseudospectra](#). *SIAM J. Matrix Anal. Appl.*, 21(4):1185–1201, 2000.
- [326] Nicholas J. Higham and Françoise Tisseur. [More on pseudospectra for polynomial eigenvalue problems and applications in control theory](#). *Linear Algebra Appl.*, 351–352:435–453, 2002.

- [327] Nicholas J. Higham and Françoise Tisseur. [Bounds for eigenvalues of matrix polynomials](#). *Linear Algebra Appl.*, 358:5–22, 2003.
- [328] Nicholas J. Higham, Françoise Tisseur, and Paul M. Van Dooren. [Detecting a definite Hermitian pair and a hyperbolic or elliptic quadratic eigenvalue problem, and associated nearness problems](#). *Linear Algebra Appl.*, 351–352:455–474, 2002.
- [329] Ramaseshan Kannan, Stephen Hendry, Nicholas J. Higham, and Françoise Tisseur. [Detecting the causes of ill-conditioning in structural finite element models](#). *Computers and Structures*, 133:79–89, 2014.
- [330] Lijing Lin, Nicholas J. Higham, and Jianxin Pan. [Covariance structure regularization via entropy loss function](#). *Comput. Statist. Data Anal.*, 72:315–327, 2014.
- [331] Prashanth Nadukandi and Nicholas J. Higham. [Computing the wave-kernel matrix functions](#). *SIAM J. Sci. Comput.*, 40(6):A4060–A4082, 2018.
- [332] Yuji Nakatsukasa and Nicholas J. Higham. [Backward stability of iterations for computing the polar decomposition](#). *SIAM J. Matrix Anal. Appl.*, 33(2):460–479, 2012.
- [333] Yuji Nakatsukasa and Nicholas J. Higham. [Stable and efficient spectral divide and conquer algorithms for the symmetric eigenvalue decomposition and the SVD](#). *SIAM J. Sci. Comput.*, 35(3):A1325–A1349, 2013.
- [334] Françoise Tisseur and Nicholas J. Higham. [Structured pseudospectra for polynomial eigenvalue problems, with applications](#). *SIAM J. Matrix Anal. Appl.*, 23(1):187–208, 2001.
- [335] David Topping, Mark Barley, Michael K. Bane, Nicholas Higham, Bernard Aumont, Nicholas Dingle, and Gordon McFiggans. [UMan-SysProp V1.0: An online and open-source facility for molecular property prediction and atmospheric aerosol calculations](#). *Geoscientific Model Development*, 9(2):899–914, 2016.
- [336] Anne Trefethen, Nick Higham, Iain Duff, and Peter Coveney. Applications/algorithms roadmapping activity. First stage final report. MIMS

EPrint 2009.85, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, June 2009. 84 pp.

- [337] Anne Trefethen, Nick Higham, Iain Duff, and Peter Coveney. [Developing a high-performance computing/numerical analysis roadmap](#). *Int. J. High Performance Computing Applications*, 23(4):423–426, 2009.
- [338] Weijian Zhang, Jonathan Deakin, Nicholas J. Higham, and Shuaiqiang Wang. [Etymo: A new discovery engine for AI research](#). In *Companion Proceedings of the Web Conference 2018*, WWW '18, International World Wide Web Conferences Steering Committee, Republic and Canton of Geneva, Switzerland, 2018, pages 227–230.
- [339] Weijian Zhang and Nicholas J. Higham. [Matrix Depot: An extensible test matrix collection for Julia](#). *PeerJ Comput. Sci.*, 2:e58, 2016.
- [340] Mawussi Zounon, Nicholas J. Higham, Craig Lucas, and Françoise Tisseur. [Performance evaluation of mixed precision algorithms for solving sparse linear systems](#). MIMS EPrint 2020.21, Manchester Institute for Mathematical Sciences, The University of Manchester, UK, September 2020. 18 pp.