Lloyd N. Trefethen FRS

Oxford University Computing Laboratory
Wolfson Building, Parks Road
Oxford OX1 3QD UK
(01865) 273886, Fax (01865) 273839
LNT@comlab.ox.ac.uk
www.comlab.ox.ac.uk/nick.trefethen/

Born 30 August 1955
Married, two children
US citizen, UK resident
Home phone (01865) 742678
September 2006

RESEARCH INTERESTS

Numerical analysis/applied mathematics, and in particular:
1. Finite difference and spectral methods for partial differential equations
2. Numerical linear algebra
3. Numerical conformal mapping and complex analysis
4. Approximation theory, quadrature, and related numerical methods
5. Eigenvalues, pseudospectra and dynamics
6. Fluid dynamics

EMPLOYMENT

Professor of Numerical Analysis and Fellow of Balliol College, Oxford University: 1997-
Professor of Computer Science, Cornell University: 1994-97
Associate Professor of Computer Science, Cornell University: 1991-93
Associate Professor of Applied Mathematics, MIT: 1987-91
Assistant Professor of Applied Mathematics, MIT: 1984-87
NSF Postdoct. Fellow and Adj. Asst. Prof., Courant Institute, New York University: 1982-84

EDUCATION

PhD (Computer Science/Numerical Analysis), Stanford University: 1982
MS (Computer Science/Numerical Analysis), Stanford University: 1980
AB summa cum laude (Applied Mathematics), Harvard College: 1977 (top 1% of class)
Phillips Exeter Academy: 1973 (top 1% of class)

FELLOWSHIPS, HONORS AND AWARDS

Fellowship of the Royal Society: 2005
Catherine Richards Prize (best paper in *Mathematics Today*), Inst. Maths. Applics.: 2000
Rouse Ball Lecturer (honorary 1-year appointment), U. of Cambridge: 1998/1999
Dean's Prize for Excellence and Innovation and Teaching and Advising, Cornell U.: 1994
NSF Presidential Young Investigator Award: 1986-91
Graduate Student Council Teaching Award, MIT: 1990
IBM Faculty Development Award: 1986-88
First Prize, Fox Competition in Numerical Analysis: 1985
NSF Mathematical Sciences Postdoctoral Fellowship: 1982-84
Hertz Foundation Fellowship: 1980-82
NSF Graduate Fellowship: 1977-80
Phi Beta Kappa: 1975 (elected as a Junior at Harvard College)

AFFILIATIONS

Society for Industrial and Applied Mathematics (member of Council, 1996-2001;
SIAM Representative to ICIAM Council, 2001-; member of Board of Trustees, 2004-)
SIAM UK and Republic of Ireland Section (President, 2005-2007)
London Mathematical Society (member of Prizes Committee 1998-2001)
Institute of Maths. and its Applications (member of Fox Prize Committee, 1996-2001)
American Mathematical Society
Mathematical Association of America

EDITORIAL
Editor, *SIAM Journal on Numerical Analysis:* 1984-1999
Associate Editor, *Journal of Computational and Applied Mathematics:* 1987-
Associate Editor and Editor, *Numerische Mathematik:* 1988-1999
Editor, *SIAM Review:* 1989-
Section Editor, Survey and Review articles, *SIAM Review:* 1998-2002
Associate Editor, *Japan Journal of Industrial and Applied Mathematics:* 1991-1996
Associate Editor, *IMA Journal of Numerical Analysis:* 1997-
Editor, *Calcolo:* 1998-
Associate Editor, *Linear Algebra and its Applications:* 2001-2006
Associate Editor, *Advances in Computational Mathematics:* 2001-
Associate Editor, *Computational Methods in Function Theory:* 2001-
Member of Editorial Board, *Proceedings of the Royal Society A:* 2003-

REFEREEING
About twenty papers a year for numerous journals.

PhD/DPhil STUDENTS
16 so far at MIT, Cornell and Oxford: Alan Edelman, Louis Howell, Walter Mascarenhas, Satish Reddy, Noël Nachtigal, Toby Driscoll, Kim-Chuan Toh, Jeffrey Baggett, Divakar Viswanath, Thomas Wright, Lehel Banjai, Aly-Khan Kassam, Timo Betcke, Zachary Battles, Teik-Wynn Tee, Thomas Schmelzer.

PUBLICATIONS
Five books, about eighty journal publications with 39 coauthors, and various essays and other items.

SELECTED INVITED LECTURES
Norbert Wiener Lecturer, Tufts U.: October 2005
A. R. Mitchell Lecturer, Dundee Biennial Conf. on Numerical Analysis, Dundee: June 2005
Computational Methods and Function Theory 2005, Joensuu, Finland: June 2005
2005 UAB Int. Conf. on Diff. Eqs. Math. Phys., Birmingham, AL: April 2005
Rees Lecturer, U. of Delaware: April 2003
SIAM 50th Anniversary Annual Meeting, Philadelphia: July 2002
Joint Plenary Lecture, British Maths. and Applied Maths. Colloquia, Warwick: April 2002
Nineteenth Dundee Biennial Conference on Numerical Analysis, Dundee: June 2001
LAA Lecturer, 9th ILAS conference, Haifa, Israel: June 2001
Opening public lecturer in Maths in Action series at Royal Institution, London: Feb. 2001
Keynote speaker, 25th Woudschoten Conf. on Numerical Analysis, Netherlands: Oct. 2000
Keynote speaker, SANUM, Stellenbosch, South Africa: April 1999
Inaugural Lecture as Professor of Numerical Analysis, Oxford U.: April 1999
Annual address to the Edinburgh Mathematical Society: Oct. 1998
International Congress of Mathematicians, Berlin: Aug. 1998
Alan Tayler Lecture, Oxford U.: Nov. 1997
Seventeenth Dundee Biennial Conference on Numerical Analysis, Dundee: June 1997
Foundations of Computational Mathematics, Rio de Janeiro: Jan. 1997
Third Int'l. Congress on Applied and Industrial Mathematics, Hamburg: July 1995

OTHER LECTURES
At about 160 universities and research institutions in Europe, North America, Australia, Asia, and Africa.

Publications by Lloyd N. Trefethen

I. Books

I.1. *Numerical Conformal Mapping*, editor, 269 pages. Elsevier, 1986.

I.2. *Finite Difference and Spectral Methods for Ordinary and Partial Differential Equations*, x+315 pages. Graduate textbook, privately published at `http://comlab.ox.ac.uk/nick.trefethen/`, 1996.

I.3. *Numerical Linear Algebra*, with David Bau III, xii+361 pages. SIAM, 1997. (SIAM's bestselling book of the past decade.)

I.4. *Spectral Methods in MATLAB*, xviii+165 pages. SIAM, 2000.

I.5. *Schwarz-Christoffel Mapping*, with Tobin A. Driscoll, xvi+132 pages. Cambridge U. Press, 2002.

I.6. *Spectra and Pseudospectra: The Behavior of Nonnormal Matrices and Operators*, with Mark Embree, xviii+606 pages. Princeton U. Press, 2005. (Winner of Honorable Mention, 2005 Awards for Excellence in Professional/Scholar Publishing in Mathematics and Statistics, Association of American Publishers.)

In addition to these a pair of books have been published about the problem solving challenge I organised in 2002 (item VIII.8 below): F. Bornemann, D. Laurie, S. Wagon and D. Waldvogel, *The SIAM 100-Digit Challenge*, SIAM, 2004; extended and translated into German as *Vom Lösen numerischer Probleme: Ein Streifzug entlang der "SIAM 10×10 Digit Challenge"*, Springer, 2006.

II. Finite difference and spectral methods for partial differential equations

II.1. Group velocity in finite difference schemes. SIAM *Review* 24 (1982), 113-136.

II.2. Group velocity interpretation of the stability theory of Gustafsson, Kreiss, and Sundström. *J. Comp. Phys*. 49 (1983), 199-217.

II.3. On L^p-instability and dispersion at discontinuities in finite difference schemes. In R. Vichnevetsky and R. Stepleman, eds., *Proc. Fifth IMACS Int. Symp. on Computer Methods for Partial Diffl. Eqs*., IMACS, 1984.

II.4. Instability of finite difference models for hyperbolic initial boundary value problems. *Comm. Pure Appl. Math*. 37 (1984), 329-367. (This article won the first Fox Prize in Numerical Analysis.)

II.5. Stability of difference models containing two boundaries or interfaces. *Math. Comp*. 45 (1985), 279-300.

II.6. Stability of hyperbolic finite-difference models with one or two boundaries. In B. E. Engquist, et al., eds., *Large-Scale Computations in Fluid Mechanics*, v. 2, Amer. Math. Soc., 1985.

II.7. Dispersion, dissipation, and stability. In D. F. Griffiths and G. A. Watson, eds., *Numerical Analysis*, Longman, 1986.

II.8. Well-posedness of absorbing boundary conditions and one-way wave equations, with L. Halpern. *Math. Comp*. 47 (1986), 421-435.

II.9. An instability phenomenon in spectral methods, with M. R. Trummer. *SIAM J. Numer. Anal*. 24 (1987), 1008-1023.

II.10. Wide-angle one-way wave equations, with L. Halpern. *J. Acoust. Soc. Amer*. 84 (1988), 1397-1404.

II.11. Fourier analysis of the SOR iteration, with R. J. LeVeque. *IMA J. Numer. Anal*. 8 (1988), 273-279.

II.12. Ill-posedness of absorbing boundary conditions for migration, with L. H. Howell. *Geophysics* 53 (1988), 593-603.

II.13. The eigenvalues of second-order spectral differentiation matrices, with J. A. C. Weideman. *SIAM J. Numer. Anal*. 25 (1988), 1279-1298.

II.14. Lax-stability vs. eigenvalue stability of spectral methods. In K. W. Morton and M. J. Baines, eds., Clarendon Press, 1988.

II.15. Stability of the method of lines, with S. C. Reddy. *Numer. Math*. 62 (1992), 235-267.

II.16. Stiffness of ODEs, with D. J. Higham. *BIT* 33 (1993), 285-303.

II.17. Fourth-order time-stepping for stiff PDEs, with A. K. Kassam. *SIAM J. Sci. Comp.* 26 (2003), 1214-1233.

II.18. Reviving the method of particular solutions, with T. Betcke. *SIAM Review* 47 (2005), 469-491.

II.19. Computations of eigenvalue avoidance in planar domains, with T. Betcke. *Proc. Appl. Math. Mech.* 4 (2004), 634-635.

II.20. Computed eigenmodes of planar regions, with T. Betcke. In N. Chernov, et al., eds., *Recent Advances in Differential Equations and Mathematical Physics,* Contemp. Math. 412, Amer. Math. Soc., 2006, pp. 297-314.

II.21. A rational spectral collocation method with adaptively transformed Chebyshev grid points, with T.-W. Tee. *SIAM J. Sci. Comp.*, submitted.

III. Numerical linear algebra

III.1. Three mysteries of Gaussian elimination. *ACM SIGNUM Newsletter*, October 1985.

III.2. Average-case stability of Gaussian elimination, with R. S. Schreiber. *SIAM J. Matrix Anal. Applics*. 11 (1990), 335-360.

III.3. Approximation theory and numerical linear algebra. In J. C. Mason and M. G. Cox, eds., *Algorithms for Approximation II*, Chapman and Hall, 1990.

III.4. A hybrid GMRES algorithm for nonsymmetric linear systems, with N. M. Nachtigal and L. Reichel. *SIAM J. Matrix Anal. Applics*. 13 (1992), 796-825.

III.5. How fast are nonsymmetric matrix iterations?, with N. M. Nachtigal and S. C. Reddy. *SIAM J. Matrix Anal. Applics*. 13 (1992), 778-795.

III.6. GMRES/CR and Arnoldi/Lanczos as matrix approximation problems, with A. Greenbaum. *SIAM J. Sci. Comput*. 15 (1994), 359-368.

III.7. Calculation of pseudospectra by the Arnoldi iteration, with K.-C. Toh. *SIAM J. Sci. Comp*. 17 (1996), 1-15.

III.8. The Chebyshev polynomials of a matrix, with K.-C. Toh. *SIAM J. Matrix Anal. Applics*. 20 (1998), 400-419.

III.9. From potential theory to matrix iterations in six steps, with T. A. Driscoll and K.-C. Toh. *SIAM Review* 40 (1998), 547-578.

III.10. Condition numbers of random triangular matrices, with D. Viswanath. *SIAM J. Matrix Anal. Applics*. 19 (1998), 564-581.

IV. Numerical conformal mapping and complex analysis

IV.1. Numerical computation of the Schwarz-Christoffel transformation. *SIAM J. Sci. Stat. Comput*. 1 (1980), 82-102.

IV.2. Computation and application of Schwarz-Christoffel transformations. In *Proceedings of the 1980 Army Numerical Analysis and Computers Conference*, Army Research Office, 1980.

IV.3. Analysis and design of polygonal resistors by conformal mapping. *Z. Angew. Math. Phys*. 35 (1984), 692-704.

IV.4. Conformal mapping solution of Laplace's equation on a polygon with oblique derivative boundary conditions, with R. J. Williams. *J. Comp. Appl. Math*. 14 (1986), 227-249.

IV.5. Schwarz-Christoffel mapping in the 1980's. Numerical Analysis Report 89-1, Dept. of Mathematics, MIT, 1989.

IV.6. SCPACK User's Guide. Numerical Analysis Report 89-2, Dept. of Mathematics, MIT, 1989. (An earlier edition appeared as an ICASE internal report in 1983.)

IV.7. A modified Schwarz-Christoffel transformation for elongated regions, with L. H. Howell. *SIAM J. Sci. Stat. Comput*. 11 (1990), 928-949.

IV.8. Numerical construction of conformal maps. Appendix to E. B. Saff and A. D. Snider, *Fundamentals of Complex Analysis*, 2nd ed., Prentice Hall, 1993.

IV.9. Schwarz-Christoffel mapping in the computer era, with T. A. Driscoll, *Proc. Int. Congress Mathematicians 1998*, pp. 533-542, 1998.

IV.10. Green's functions for multiply connected domains via conformal mapping, with M. Embree. *SIAM Review* 41 (1999), 721-744.

IV.11. Numerical solution of the omitted area problem of univalent function theory, with L. Banjai. *Computational Methods and Function Theory* 1 (2001), 259-273.

IV.12. A multipole method for Schwarz-Christoffel mapping of polygons with thousands of sides, with L. Banjai. *SIAM J. Sci. Comp.* 25 (2003), 1042-1065.

V. Approximation theory, quadrature, and related numerical methods

V.1. Near-circularity of the error curve in complex Chebyshev approximation. *J. Approx. Theory* 31 (1981), 344-367.

V.2. Rational Chebyshev approximation on the unit disk. *Numer. Math*. 37 (1981), 297-320.

V.3. Real polynomial Chebyshev approximation by the Carathéodory-Féjér method, with M. H. Gutknecht. *SIAM J. Numer. Anal*. 19 (1981), 358-371.

V.4. Chebyshev approximation on the unit disk. In *Computational Aspects of Complex Analysis*, H. Werner, et al., eds., D. Reidel, 1983.

V.5. Real and complex Chebyshev approximation on the unit disk and interval, with M. H. Gutknecht. *Bull. Amer. Math. Soc*. 8 (1983), 455-458.

V.6. Nonuniqueness of best rational Chebyshev approximations on the unit disk, with M. H. Gutknecht. *J. Approx. Theory* 39 (1983), 275-288.

V.7. Real vs. complex rational Chebyshev approximation on an interval, with M. H. Gutknecht. *Trans. Amer. Math. Soc*. 280 (1983), 555-561.

V.8. The Carathéodory-Féjér method for real rational approximation, with M. H. Gutknecht. *SIAM J. Numer. Anal*. 20 (1983), 420-436.

V.9. The Carathéodory-Féjér (CF) method for recursive digital filter design, with M. H. Gutknecht and J. O. Smith. *IEEE Trans. Acoustics, Speech, and Signal Proc*. ASSP-31 (1983), 1417-1426.

V.10. Circularity of the error curve and sharpness of the CF method in complex Chebyshev approximation. *SIAM J. Numer. Anal*. 20 (1983), 1258-1263.

V.11. Real vs. complex rational Chebyshev approximation on complex domains, with M. H. Gutknecht. In L. Collatz et al., eds., *Numerical Methods of Approximation Theory*, v. 7, Birkhäuser, 1984.

V.12. Square blocks and equioscillation in the Padé, Walsh, and CF tables. In P. R. Graves-Morris, et al., eds., *Rational Approximation and Interpolation*, Lect. Notes in Math, v. 1105, Springer, 1984.

V.13. The asymptotic accuracy of rational best approximations to e^z on a disk. *J. Approx. Theory* 40 (1984), 380-383.

V.14. On convergence and degeneracy in rational Padé and Chebyshev approximation, with M. H. Gutknecht. *SIAM J. Math. Anal*. 16 (1985), 198-210.

V.15. MATLAB programs for CF approximation. In C. K. Chui, et al., eds., *Approximation Theory V*, Academic Press, 1986.

V.16. Padé, stable Padé, and Chebyshev-Padé approximation, with M. H. Gutknecht. In J. Mason, ed., *Algorithms for Approximation*, Clarendon Press, 1987.

V.17. The CF table, with E. Hayashi and M. H. Gutknecht. *Constr. Approx.* 6 (1990), 195-223.

V.18. Two results on polynomial interpolation in equally spaced points, with J. A. C. Weideman. *J. Approx. Theory* 65 (1991), 247-260.

V.19. Barycentric Lagrange interpolation, with J.-P. Berrut. *SIAM Review* 46 (2004), 501-517.

V.20. Talbot quadratures and rational approximations, with J. A. C. Weideman and T. Schmelzer. *BIT*, to appear.

V.21. Parabolic and hyperbolic contours for computing the Bromwich integral, with J. A. C. Weideman. *Math. Comput.*, to appear.

V.22. Computing the gamma function, with T. Schmelzer. *SIAM J. Numer. Anal.*, to appear.

V.23. An extension of Matlab to continuous functions and operators, with Z. Battles. *SIAM J. Sci. Comp.* 25 (2004), 1743-1770.

V.24. Is Gauss quadrature better than Clenshaw-Curtis? *SIAM Review*, submitted.

V.25. The kink phenomenon in Fejér and Clenshaw-Curtis quadrature, with J. A. C. Weideman. *Numer. Math.*, submitted.

VI. Eigenvalues, pseudospectra and dynamics

VI.1. On the resolvent condition in the Kreiss Matrix Theorem, with R. J. LeVeque. *BIT* 24 (1984), 584-591.

VI.2. Lax-stability of fully discrete spectral methods via stability regions and pseudo-eigenvalues, with S. C. Reddy. *Comp. Meth. Appl. Mech. Engr*. 80 (1990), 147-164.

VI.3. Eigenvalues and pseudo-eigenvalues of Toeplitz matrices, with L. Reichel. *Lin. Alg. Applics*. 162-164 (1992), 153-185.

VI.4. Pseudospectra of matrices. In D. F. Griffiths and G. A. Watson, eds., *Numerical Analysis 1991*, Longman, 1992.

VI.5. From the Buffon needle problem to the Kreiss Matrix Theorem, with E. Wegert. *Amer. Math. Monthly* 101 (1994), 132-139.

VI.6. Pseudospectra of the convection-diffusion operator, with S. C. Reddy. *SIAM J. Appl. Math*. 54 (1994), 1634-1649.

VI.7. Pseudozeros of polynomials and pseudospectra of companion matrices, with K. Toh. *Numer. Math*. 68 (1994), 403-425.

VI.8. Do the pseudospectra of a matrix determine its behavior? with A. Greenbaum. Unpublished technical report, 1995.

VI.9. Matrix behaviour, unitary reducibility, and Hadamard products, with D. Viswanath. Tech. Rep. TR96-1596, Dept. of Comp. Sci., Cornell U., July, 1996.

VI.10. Pseudospectra of the wave operator with an absorbing boundary, with T. A. Driscoll. *J. Comp. Appl. Math*. 69 (1996), 125-142.

VI.11. Pseudospectra of linear operators. *ICIAM '95: Proceedings of the Third International Congress on Industrial and Applied Mathematics*, Akademie-Verlag, Berlin, 1996, pp. 401-434; also *SIAM Review* 39 (1997), 383-406.

VI.12. A numerical analyst looks at the 'cutoff phenomenon' in card shuffling and other Markov chains, with G. F. Jonsson. In D. F. Griffiths, D. J. Higham, and G. A. Watson, eds., *Numerical Analysis 1997*, Addison Wesley Longman, 1998.

VI.13. The Kreiss matrix theorem on a general complex domain, with K.-C. Toh. *SIAM J. Matrix Anal. Applics*. 21 (1999), 145-165.

VI.14. Spectra and pseudospectra. In M. Ainsworth, J. Levesley, and M. Marletta, *The Graduate Student' s Guide to Numerical Analysis*, Springer, 1999, pp. 217-250.

VI.15. Computation of pseudospectra. *Acta Numerica* 8 (1999), 247-295.

VI.16. The Pseudospectra Gateway, with Mark Embree. Web Site at `http://www.comlab.ox.ac.uk/pseudospectra`, 2000.

VI.17. Eigenvalues and musical instruments, with V. E. Howle. *J. Comp. Appl. Math*. 135 (2001), 23-40.

VI.18. Generalizing eigenvalue theorems to pseudospectra theorems, with Mark Embree. *SIAM J. Sci. Comput*. 23 (2001), 583-590.

VI.19. Large-scale computation of pseudospectra using ARPACK and eigs, with Thomas G. Wright. *SIAM J. Sci. Comput*. 23 (2001), 591-605.

VI.20. Spectra, pseudospectra and localization for random bidiagonal matrices, with M. Contedini and M. Embree. *Comm. Pure Appl. Math*. 54 (2001), 595-623.

VI.21. Piecewise continuous Toeplitz matrices and operators: slow approach to infinity, with A. Böttcher and M. Embree. *SIAM J. Matrix Anal. Applics.* 24 (2002), 484-489.

VI.22. Eigenvalues and pseudospectra of rectangular matrices, with T. G. Wright. *IMA J. Numer. Anal.* 22 (2002), 501-519.

VI.23. Wave packet pseudomodes of twisted Toeplitz matrices, with S. J. Chapman. *Comm. Pure Appl. Math.* 57 (2004), 1233-1264.

VI.24. Wave packet pseudomodes of variable coefficient differential operators. *Proc. Roy. Soc. Lond. A* 561 (2005), 3099-3122.

VII. Fluid dynamics

VII.1. Classical free-streamline flow over a polygonal obstacle, with A. R. Elcrat. *J. Comp. Appl. Math*. 14 (1986), 251-265.

VII.2. Ideal jet flow in two dimensions, with F. Dias and A. R. Elcrat. *J. Fluid Mech*. 185 (1987), 275-288.

VII.3. Hydrodynamic stability without eigenvalues, with A. E. Trefethen, S. C. Reddy, and T. A. Driscoll. *Science* 261 (1993), 578-584.

qVII.4. A mostly linear model of transition to turbulence, with J. S. Baggett and T. A. Driscoll. *Physics of Fluids* 7 (1995), 833-838.

VII.5. Low-dimensional models of subcritical transition to turbulence, with J. S. Baggett. *Physics of Fluids* 9 (1997), 1043-1053.

VII.6. Spectra and pseudospectra for pipe Poiseuille flow, with A. E. Trefethen and P. J. Schmid. *Comp. Meth. Appl. Mech. Engr*. 1926 (1999), 413-420.

VII.7. Large-amplitude transient growth in the linear evolution of equatorial spread *F* with a sheared zonal flow, with J. P. Flaherty and C. E. Seyler. *J. Geophys. Res*. 104 (1999), 6843.

VII.8. Threshold amplitudes for transition to turbulence in a pipe, with S. J. Chapman, D. S. Henningson, A. Meseguer, T. Mullin, and F. T. M. Nieuwstadt. Num. Anal. Group Report NA 00/17, Oxford U. Computing Lab., 2000.

VII.9 Linearized pipe flow to Reynolds number 10^7, with A. Meseguer. *J. Comp. Phys*. 186 (2003), 178-197.

VIII. Essays and other items

VIII.1. The definition of numerical analysis. *SIAM News* 25, 6 Nov. 1992; reprinted in *Bull. Inst. Maths. and Applics.*, 1993 and again as an appendix to L N. Trefethen and D. A. Bau, III, *Numerical Linear Algebra,* SIAM, 2000.

VIII.2. MultiMATLAB: MATLAB on multiple processors, with A. E. Trefethen et al. Tech. Rep. CTC96TR293, Cornell Theory Center, 1996.

VIII.3. Maxims about numerical mathematics, computers, science, and life. *SIAM News* v. 31, no. 1 (1998), p. 4.

VIII.4. Growth and decay of random Fibonacci sequences, with M. Embree. *Proc. Royal Soc. Lond. A* 455 (1999), 2471-2485.

VIII.5. Predictions for scientific computing fifty years from now. *Mathematics Today*, April 2000, 53-57. (This essay won the Catherine Richards Prize of the Inst. for Maths. and Applics., 2000.)

VIII.6. How many shuffles to randomize a deck of cards?, with L. M. Trefethen. *Proc. Roy. Soc. London* A 456 (2000), 2561-2568. (This article led to dozens of press reports in newspapers, magazines, radio and television.)

VIII.7. Computing Lyapunov constants for random recurrences with smooth coefficients, with T. G. Wright, *J. Comp. Appl. Math*. 132 (2001), 331-340.

VIII.8. A hundred-dollar, hundred-digit challenge. Article in *SIAM News*, Jan./Feb. 2002 with follow-up article in *SIAM News*, July/Aug. 2002. (This led to the books by Bornemann et al. listed above under Books.)

VIII.9 An American at Oxford, *Oxford Magazine*, May 2003. (This essay was discussed in the *Times Higher Education Supplement* and elsewhere.)

VIII.10 Ten Digit Algorithms, Numerical Analysis Report 05/13, Oxford University, 2005. (From the 2005 A. R. Mitchell Lecture, Dundee.)

VIII.11 Numerical analysis, to appear in W. T. Gowers, ed., *Princeton Companion to Mathematics*, Princeton U. Press.