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Daniel B. Szyld

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Ph.D. in Mathematics (Numerical Analysis, Olof B. Widlund, advisor), October 1983, Courant Institute of Mathematical Sciences, New York University.

Undergraduate studies at the School of Exact Sciences, University of Buenos Aires, 1973–1977.

AREAS OF RESEARCH

Computational Mathematics, Numerical Analysis, and Linear Algebra: Sparse matrix techniques. Parallel asynchronous iterations for linear and nonlinear systems. Conjugate gradient type methods. Applications to the solution of Partial Differential Equations. Domain decomposition and Schwarz methods. Applications to Markov chains and Markov processes. Nonnegative matrices and applications. Linear and nonlinear matrix equations. Linear and nonlinear eigenvalue problems.

TEACHING POSITIONS (selection)

Department of Mathematics, Temple University, Professor (since 1995), Associate Professor (1990–1995).

Department of Computer Science, Duke University, Assistant Professor (1986–1990), Visiting Assistant Professor (1985–1986).

AWARDS AND HONORS (most recent)

Elected President of the International Linear Algebra Society, 2020. (Three-year term).

Featured interview, *IMAGE*, The Bulletin of the International Linear Algebra Society, Issue 61, Fall 2018, pp. 6–8, conducted by Froilán Dopico.

Achievement in Mathematics Award, College of Science of Technology 20th Anniversary Special Recognition, Temple University, November 2018.

Fellow of the Society of Industrial and Applied Mathematics, Class of 2017.

Fellow of the American Mathematical Society, Class of 2017.

SELECTED RECENT GRANTS

Department of Energy Research Grant, Office of Science, Program of Advanced Scientific Computing Research, Division of Applied Mathematics, Asynchronous Iterative Solvers For Extreme-Scale Computing, 2016–2020.

Tonia Hsieh, P.I., Daniel B. Szyld, Co-P.I., Temple University, Office of Vice-Provost for Research, Targeted Research Grant, Understanding Deformation Patterns of Suspension and Granular Material. Academic years 2015–16 and 2016–17.

Isaac Klapper, P.I., Daniel B. Szyld, Co-P.I., National Science Foundation Research Grant, Division of Mathematical Sciences, Program in Mathematical Biology, Collabora-

tive Research: Connecting Omics to Physical and Chemical Environment in Community Microbial Ecology, 2015–2018.

National Science Foundation Research Grant, Division of Mathematical Sciences, Program in Computational Mathematics, Multiple Preconditioning for Saddle-Point and other Problems, 2014–2017.

National Science Foundation Research Grant, Division of Mathematical Sciences, Program in Computational Mathematics, Eigenvalues problems, Krylov subspace methods, and subspace recycling, 2011–2014 (with Fei Xue, Co-PI).

Department of Energy Research Grant, Office of Science, Program of Advanced Scientific Computing Research, Division of Applied Mathematics, Krylov Subspace and Schwarz Methods for PDEs and Control Problems, 2008–2010.

EDITORIAL WORK (selection)

Electronic Transactions on Numerical Analysis, Editor, 1998–2004. 2014–present. Editor in Chief, 2005–2013.

Linear Algebra and its Applications, Associate Editor, 2011–2015, Senior Editor 2016–2022.

Mathematics of Computation, Associate Editor, 2007–2016. Editor, 2017–2021.

Numerical Linear Algebra with Applications, Member of the Editorial Board, 2008–present.

SIAM Journal on Matrix Analysis and Applications, Member of the Editorial Board, 2003–2014. Editor-in-Chief 2015–2020.

Electronic Journal of Linear Algebra, Associate Editor, 1995–2001; Advisory Editor 2001–present.

CONFERENCE ORGANIZATION (most recent, selection)

Member, Special Sessions Subcommittee, Mathematical Congress of the Americas, 19–24 July 2021, Buenos Aires, Argentina.

Co-organizer (with Benjamin Seibold). Mid-Atlantic Numerical Analysis Day, 15 November 2019, Temple University, Philadelphia.

Co-organizer (with Victorita Dolean and Nicole Spillane), Workshop on Parallel Solution Methods for Systems Arising from PDEs, 16–20 September 2019, Centre International de Rencontres Mathématiques, Luminy, France.

Co-organizer (with Christian Glusa), Minisymposium on Asynchronous Iterative Methods, Ninth International Congress on Industrial and Applied Mathematics (ICIAM 2019), Valencia, Spain, 15–19 July 2019.

Co-organizer (with Xiao-Chuan Cai and Marcus Sarkis). Mini-symposium on Numerical Approaches for Solving Large-Scale Sparse Systems, Twentysecond Conference of the International Linear Algebra Society (ILAS), 8–12 July 2019, Rio de Janeiro, Brazil.

Member, Program Committee, The International Conference on Preconditioning Techniques for Scientific and Industrial Applications (Precon-19) 1-3 July 2019, University of Minnesota, Twin cities, Minneapolis, Minnesota.

Co-organizer (with Susanne Brenner, Igor Shparlinski, and Chi-Wang Shu), Celebrating 75 Years of Mathematics of Computation, 1–3 November 2018, Workshop held at the Institute for Computational and Experimental Research in Mathematics (ICERM), Providence, RI.

Co-organizer (with Eugene Vecharynski), SIAM Special Session on Numerical Linear Algebra, Joint Mathematics Meeting, 10–13 January 2018, San Diego.

Member of the Scientific Committee, Capricorn Congress of Mathematics, August 2016, Antofagasta, Chile.

Co-organizer. Workshop on Theoretical and Applied Aspects of Nonnegative Matrices, 27–29 July 2012, Banff International Research Station for Mathematical Innovation and Discovery, Banff, Alberta, Canada.

OTHER PROFESSIONAL SERVICE (selection):

External review panel for the Department of Mathematics, Baruch College, City University of New York, May 2000.

Chair of the SIAM Activity Group on Linear Algebra, 2007–2009.

Member of the Joint Policy Board of Mathematics Committee for the Mathematics Awareness Month 2008.

Chair of the Gene Golub SIAM Summer School Committee, 2010–2013.

Member of the Board of Advisors of Accelelogic (a software company for High Performance Computing), since 2012.

Vice President at Large, SIAM, Society of Industrial and Applied Mathematics, 2014–2015.

President of the International Linear Algebra Society (ILAS), 2020–2023.

External member of several doctoral committees for the Federal University of Rio de Janeiro, Brazil, the Instituto Nacional de Matemática Pura e Aplicada (IMPA), Rio de Janeiro, Brazil, Universidad Católica del Norte, Antofagasta, Chile, the University of Wuppertal, Germany, the Technical University of Berlin, Germany, the University of Mauritius, the Delft University of Technology, The Netherlands, the University of Valencia, Spain, the University of Alicante, Spain, Drexel University, and Emory University.

RESEARCH ARTICLES IN REFEREED JOURNALS (selection):

5. Wassily Leontief, Faye Duchin and Daniel B. Szyld, New Approaches in Economic Analysis, *Science* **228** (1985) 419–422.
6. Daniel B. Szyld, Conditions for the Existence of a Balanced Growth Solution for the Leontief Dynamic Input-Output Model, *Econometrica* **53** (1985) 1411–1419.

8. Daniel B. Szyld, Criteria for Combining Inverse and Rayleigh Quotient Iteration, *SIAM Journal on Numerical Analysis*, **25** (1988) 1369–1375.
10. Ivo Marek and Daniel B. Szyld, Comparison Theorems for Weak Splittings of Bounded Operators, *Numerische Mathematik*, **58** (1990) 387–397.
16. Andreas Frommer and Daniel B. Szyld, H -splittings and Two-stage Iterative Methods, *Numerische Mathematik* **63** (1992) 345–356.
17. Daniel B. Szyld and Olof B. Widlund, Variational Analysis of Some Conjugate Gradient Methods, *East-West Journal of Numerical Mathematics*, **1** (1993) 51–74.
19. Daniel B. Szyld, Equivalence of Convergence Conditions for Iterative Methods for Singular Equations, *Numerical Linear Algebra with Applications*, **1** (1994) 151–154.
21. Andreas Frommer and Daniel B. Szyld, Asynchronous Two-stage Methods, *Numerische Mathematik*, **69** (1994) 141–153.
23. Ricardo D. Pantazis and Daniel B. Szyld, Regions of Convergence of the Rayleigh Quotient Iteration Method, *Numerical Linear Algebra with Applications*, **2** (1995) 251–269.
28. Michele Benzi and Daniel B. Szyld, Existence and Uniqueness of Splittings for Stationary Iterative Methods with Applications to Alternating Methods, *Numerische Mathematik*, **76** (1997) 309–321.
30. Daniel B. Szyld, Different Models of Parallel Asynchronous Iterations with Overlapping Blocks, *Computational and Applied Mathematics*, **17** (1998) 101–115.
33. Michele Benzi, Daniel B. Szyld, and Arno van Duin, Orderings for Incomplete Factorization Preconditionings of Nonsymmetric Problems, *SIAM Journal on Scientific Computing*, **20** (1999) 1652–1670.
34. Andreas Frommer and Daniel B. Szyld, Weighted Max Norms, Splittings, and Overlapping Additive Schwarz Iterations, *Numerische Mathematik*, **83** (1999) 259–278.
35. Kostas Blathras, Daniel B. Szyld, and Yuan Shi, Timing Models and Local Stopping Criteria for Asynchronous Iterative Algorithms, *Journal of Parallel and Distributed Computing*. **58** (1999) 446–465.
36. Andreas Frommer and Daniel B. Szyld, On Asynchronous Iterations, *Journal of Computational and Applied Mathematics* **123** (2000) 201–216.
40. Michele Benzi, Andreas Frommer, Reinhard Nabben, and Daniel B. Szyld, Algebraic Theory of Multiplicative Schwarz Methods, *Numerische Mathematik*, **89** (2001) 605–639.
41. Andreas Frommer and Daniel B. Szyld, An Algebraic Convergence Theory for Restricted Additive Schwarz Methods Using Weighted Max Norms, *SIAM Journal on Numerical Analysis* **39** (2001) 463–479.

43. Ludwig Elsner, Andreas Frommer, Reinhard Nabben, Hans Schneider, and Daniel B. Szyld, Conditions for strict inequality in comparisons of spectral radii of splittings of different matrices, *Linear Algebra and its Applications* **363** (2003) 65–80.
44. Ivo Marek and Daniel B. Szyld, Comparison of Convergence of General Stationary Iterative Methods for Singular Matrices, *SIAM Journal on Matrix Analysis and Applications*, **24** (2002) 68–77.
45. Valeria Simoncini and Daniel B. Szyld, Flexible Inner-Outer Krylov Subspace Methods, *SIAM Journal on Numerical Analysis* **40** (2003) 2219–2239.
47. Valeria Simoncini and Daniel B. Szyld, Theory of Inexact Krylov Subspace Methods and Applications to Scientific Computing. *SIAM Journal on Scientific Computing*, **25** (2003) 454–477.
50. Valeria Simoncini and Daniel B. Szyld, On the Occurrence of Superlinear Convergence of Exact and Inexact Krylov Subspace Methods, *SIAM Review*, **47** (2005) 247–272.
51. Valeria Simoncini and Daniel B. Szyld, The effect of non-optimal bases on the convergence of Krylov Subspace Methods, *Numerische Mathematik*, **100** (2005) 711–733.
55. Daniel B. Szyld, The many proofs of an Identity on the Norm of Oblique Projections, *Numerical Algorithms*, **42** (2006) 309–323.
57. Valeria Simoncini and Daniel B. Szyld, Recent computational developments in Krylov Subspace Methods for linear systems, *Numerical Linear Algebra with Applications*, **14** (2007) 1–59.
58. Marcus Sarkis and Daniel B. Szyld, Optimal Left and Right Additive Schwarz Preconditioning for Minimal Residual Methods with Euclidean and Energy Norms, *Computer Methods in Applied Mechanics and Engineering*, **196** (2007) 1612–1621.
61. David Fritzsche, Volker Mehrmann, Daniel B. Szyld, and Elena Virnik, An SVD approach to identifying meta-stable states of Markov chains. *Electronic Transactions on Numerical Analysis*, **29** (2008), 46–69.
64. Abed Elhashash and Daniel B. Szyld, On general matrices having the Perron-Frobenius property, *Electronic Journal on Linear Algebra*, **17** (2008) 389–413.
67. Andreas Frommer, Reinhard Nabben, and Daniel B. Szyld, Convergence of Stationary Iterative Methods for Hermitian Semidefinite Linear Systems and Applications to Schwarz Methods, *SIAM Journal on Matrix Analysis and Applications*, **30** (2008) 925–938.
71. Sébastien Loisel and Daniel B. Szyld, On the convergence of Algebraic Optimizable Schwarz Methods with applications to elliptic problems, *Numerische Mathematik*, **114** (2010) 697–728.

72. Valeria Simoncini and Daniel B. Szyld, On the field of values of oblique projections, *Linear Algebra and its Applications*, **433** (2010) 810–818.
73. Valeria Simoncini and Daniel B. Szyld, Interpreting IDR as a Petrov-Galerkin method. *SIAM Journal on Scientific Computing*, **32** (2010) 1898–1912.
75. Daniel B. Szyld and Fei Xue, Efficient preconditioned inner solves for inexact Rayleigh quotient iteration and their connections to the single-vector Jacobi-Davidson method. *SIAM Journal on Matrix Analysis and Applications*, **32** (2011) 993–1018.
76. Xingwei Yang, Daniel B. Szyld, and Longin Jan Latecki, Diffusion on a Tensor Product Graph for Semi-Supervised Learning, *Advances in Imaging and Electron Physics*, **169** (2011) 147–172.
77. Olivier Dubois, Martin J. Gander, Sébastien Loisel, Amik St-Cyr, and Daniel B. Szyld, The Optimized Schwarz Method with a Coarse Grid Correction, *SIAM Journal on Scientific Computing*, **34** (2012)
78. Mark Embree, Josef A. Sifuentes, Kirk M. Soodhalter, Daniel B. Szyld, and Fei Xue, Short-Term Recurrence Krylov Subspace Methods for Nearly-Hermitian Matrices, *SIAM Journal on Matrix Analysis and Applications*, **33** (2012) 480–500.
80. Martin J. Gander, Sébastien Loisel, and Daniel B. Szyld, An optimal block iterative method and preconditioner for banded matrices with applications to PDEs on irregular domains, *SIAM Journal on Matrix Analysis and Applications*, **33** (2012) 653–680.
81. Daniel B. Szyld and Fei Xue, Local convergence analysis of several inexact Newton-type algorithms for general nonlinear eigenvalue problems. *Numerische Mathematik*, **123** (2013) 333–362.
82. David Fritzsche, Andreas Frommer, Stephen Shank, and Daniel B. Szyld, Overlapping blocks by growing a partition with applications to preconditioning. *SIAM Journal on Scientific Computing*, **35** (2013) A453–A473.
83. Xiuhong Du, Marcus Sarkis, Christian E. Schaerer, and Daniel B. Szyld, Inexact and truncated Parareal-in-time Krylov subspace methods for parabolic optimal control problems. *Electronic Transactions on Numerical Analysis*, **30** (2013) 36–57.
84. Bryan Shader, Naomi Shaked-Monderer and Daniel B. Szyld, Nearly positive matrices, *Linear Algebra and its Applications*, **449** (2014) 520–544.
87. Valeria Simoncini, Daniel B. Szyld, and Marlliny Monsalve, On two numerical methods for the solution of large-scale algebraic Riccati equations. *IMA Journal on Numerical Analysis*, **34** (2014) 904–920.
88. Daniel B. Szyld and Fei Xue, Several properties of invariant pairs of nonlinear algebraic eigenvalue problems. *IMA Journal of Numerical Analysis*, **34** (2014) 921–954.

90. Daniel B. Szyld and Fei Xue, Local convergence of Newton-like methods for degenerate eigenvalues of nonlinear eigenproblems. I. Classical algorithms. *Numerische Mathematik*, **129** (2015) 353–381.
91. Daniel B. Szyld and Fei Xue, Local convergence of Newton-like methods for degenerate eigenvalues of nonlinear eigenproblems. II. Accelerated algorithms. *Numerische Mathematik*, **129** (2015) 382–403.
95. Prince Chidyagwai, Scott Ladenheim, and Daniel B. Szyld, Constraint Preconditioning for the Coupled Stokes-Darcy System. *SIAM Journal on Scientific Computing*, **38** (2016) A668–A690.
96. Stephen D. Shank, Valeria Simoncini, and Daniel B. Szyld, Efficient low-rank solutions of Generalized Lyapunov equations, *Numerische Mathematik*, **134** (2016) 327–342.
97. Chen Greif, Tyrone Rees, and Daniel B. Szyld, GMRES with multiple preconditioners, *SeMA Journal*, **74** (2017), 213–231.
99. Frédéric Magoulès, Daniel B. Szyld, and Cédric Venet, Asynchronous Optimized Schwarz Methods with and without Overlap. *Numerische Mathematik*, **137** (2017) 199–227.
101. Andreas Frommer, Kathryn Lund, and Daniel B. Szyld, Block Krylov subspace methods for functions of matrices, *Electronic Transactions on Numerical Analysis*, **47** (2017) 100–126.

RESEARCH ARTICLES IN REFEREED PROCEEDINGS (selection):

126. Daniel B. Szyld, Perspectives on Asynchronous Computations for Fluid Flow Problems, in *Computational Fluid and Solid Mechanics*, K. J. Bathe, ed., Elsevier, 2001, pages 377–380.
132. Giorgos Kollias, Efstratios Gallopoulos, and Daniel B. Szyld. Asynchronous iterative computations with Web information retrieval structures: The PageRank case. In *Parallel Computing: Current and Future Issues of High-End Computing* (Proceedings of the International Conference Parco05), G.R. Joubert, W.E. Nagel, F.J. Peters, O. Plata, P. Tirado, E. Zapata, eds., John von Neumann-Institut für Computing (NIC), Jülich, Germany, NIC Series Volume 33, pp. 309–316, 2006.

SELECTED UNIVERSITY SERVICE

Senate Committee on the Status of Women, 2002–2005. Temple University.

Promotions Committee of the College (Arts and Sciences 1996–1998, Science and Technology 1998–1999, 2009–11, chair 2010–11), Temple University.

University Tenure and Promotions Committee, Temple University, 2011–13.

Latino Initiative Committee of the Provost, Temple University, 1997–1999.