

Thomas Trogdon

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Positions

- University of Washington** Seattle, WA
 - Professor of Applied Mathematics* 2024 -
 - Adjunct Professor of Mathematics* 2024 -
 - Affiliate of the Algorithmic Foundations of Data Science Institute* 2019 -
- University of Washington** Seattle, WA
 - Associate Professor of Applied Mathematics* 2019 - 2024
 - Adjunct Associate Professor of Mathematics* 2021 - 2024
- University of California, Irvine** Irvine, CA
 - Assistant Professor of Mathematics* 2016 - 2019
 - Member of the Institute for Mathematical Behavioral Sciences* 2018 - 2019
- Courant Institute — New York University** New York, NY
 - NSF Postdoctoral Fellow* 2013 - 2016
 - Research Supervisor: Percy Deift

Education

- University of Washington** Seattle, WA
 - Ph.D. Applied Mathematics* 2008 - 2013
 - Research Supervisor: Bernard Deconinck
- University of Washington** Seattle, WA
 - M.Sc. Applied Mathematics* 2007 - 2008
- University of Minnesota** Minneapolis, MN
 - B.Sc. Mathematics* 2003 - 2007

Awards & Honors

- NSF CAREER: Numerical Linear Algebra, Random Matrix Theory, and Applications** 2018
 - SIAM Gábor Szegő Prize** 2017
 - SIAM Richard C. DiPrima Prize** 2014
 - NSF Postdoctoral Research Fellowship** 2013
 - Marie Curie Fellowship — declined in favor of NSF Fellowship** 2013
-

Publications (available at <http://faculty.washington.edu/trogdon>)

Preprints and Articles in Review/In Press

67. C. Ballew, D. Bilman and T. Trogdon, “Efficient computation of soliton gas primitive potentials”, arXiv:2505.02029, 1-23, 2025.
66. C. Abi Younes, X. Ding and T. Trogdon, “A Lanczos-based algorithmic approach for spike detection in large sample covariance matrices”, arXiv:2504.03066, 1-42, 2025.
65. C. Ballew, T. Trogdon, and H. Wilber, “The Akhiezer iteration and an inverse-free solver for Sylvester matrix equations”, arXiv:2503.17496, 1-29, 2025.
64. T. Trogdon, “On the asymptotics of orthogonal polynomials on multiple intervals with non-analytic weights”, arXiv:2412.18656, 1-48, 2024.
63. A. Gkogkou, B. Prinari, and T. Trogdon, “Numerical inverse scattering transform for the defocusing nonlinear Schrödinger equation with box-type initial conditions on a nonzero background”, arXiv:2412:19703, 1-36, 2024.
62. T. Trogdon, “The ultraspherical rectangular collocation method and its convergence”, arXiv:2401.03608, 1-35, 2024.
61. D. Smith, T. Trogdon and V. Vasan, “Linear dispersive shocks”, arXiv:1908.08716, 1–6, 2019.
60. P. Deift, S. Miller and T. Trogdon, “Stopping time signatures for some algorithms in cryptography”, arXiv:1905.08408, 1–16, 2019.

Books and Book Chapters

59. P. Deift, G. Dubach, C. Tomei and T. Trogdon, “The Toda lattice and Universality for the Computation of the Eigenvalues of a Random Matrix”, Cambridge University Press, 2025 (expected, in copyediting).
58. P. Deift and T. Trogdon, “Universality in numerical computation with random data. Case studies, analytic results and some speculations”, E. Celledoni, G. Di Nunno, K. Ebrahimi-Fard, H. Z. Munthe-Kaas (Eds.), *Computation and Combinatorics in Dynamics, Stochastics and Control*, Springer, 2018.
57. T. Trogdon and S. Olver, “Riemann–Hilbert Problems, Their Numerical Solution and the Computation of Nonlinear Special Functions,” SIAM, 2016.
 - Featured book in SIAM Review Volume **59** Number 3
56. T. Trogdon, “A Unified Numerical Approach for the Nonlinear Schrödinger Equations,” B. Pelloni and A. S. Fokas (Eds.), *Unified transform method for boundary value problems: applications and advances*, SIAM, 2014.

Dissertation

55. T. Trogdon, “Riemann–Hilbert Problems, Their Numerical Solution and the Computation of Nonlinear Special Functions,” PhD Dissertation, University of Washington, 2013.
 - Winner of the 2014 SIAM Richard C. DiPrima Prize.

Journal Articles

54. C. Ballew and T. Trogdon, “The Akhiezer Iteration”, arXiv: 2312.02384 , 1-27, 2023. *to appear in Contemporary Mathematics*
53. T. Trogdon, “On the convergence of spectral methods involving non-compact operators”, *IMA Numer. Anal.*, 1-43, 2024.

52. T. Trogdon and Y. Zhang, “Computing the Tracy–Widom distribution for arbitrary $\beta > 0$ ”, *SIGMA*, 1-26, 20, 2024.
51. T. Chen, A. Greenbaum and T. Trogdon, “GMRES, pseudospectra, and Crouzeix’s conjecture for shifted and scaled Ginibre matrices”, *Math. Comp.*, 241-261, 2024.
50. T. Chen, T. Trogdon, S. Ubaru, “Randomized matrix-free quadrature for spectrum and spectral sum approximation”, arXiv:2204.01941, 1-50, 2022.*to appear in SISC.*
49. T. Chen and T. Trogdon, “Stability of the Lanczos algorithm on matrices with regular spectral distributions”, *Lin. Alg. and Its Appl.*, 191-237, 2024.
48. X. Ding and T. Trogdon, “A Riemann–Hilbert approach to the perturbation theory of orthogonal polynomials: Applications to numerical linear algebra and random matrix theory”, *IMRN*, 1-77, 2023.
47. C. Ballew and T. Trogdon, “A Riemann–Hilbert approach to computing the inverse spectral map for measures supported on disjoint intervals”, *Stud. Appl. Math.*, 1-33, 2023.
46. A. Liu and T. Trogdon, “An artificially-damped Fourier method for dispersive evolution equations”, *Appl. Numer. Math.*, 192, 19-40, 2023.
45. D. Bilman, P. Nabelek, and T. Trogdon, “Computation of large-genus solutions of the Korteweg-de Vries equation”, *Physica D*, 449, 2023.
44. J. Peca-Medlin and T. Trogdon, “Growth factors of random butterfly matrices and the stability of avoiding pivoting”, *SIMAX*, 1-40, 2023.
43. E. Paquette and T. Trogdon, “Universality for the conjugate gradient and MINRES algorithms on sample covariance matrices”, *Comm. Pure Appl. Math.*, 76, 1085-1136, 2023.
42. Y. Zhang and T. Trogdon, “A probabilistic analysis of the Neumann series iteration”, *MJUM*, 7, 2022.
41. X. Ding and T. Trogdon, “The conjugate gradient algorithm on a general class of spiked covariance matrices”, *Quart. Appl. Math.*, 80, 99-155, 2022.
40. X. Yang, B. Deconinck and T. Trogdon, “The numerical unified transform method for the nonlinear Schrödinger equation on the half-line”, *Nonlinearity*, 1-32, 2021.
39. T. Trogdon, “Scattering and inverse scattering for the AKNS system: A rational function approach”, *Stud. in Appl. Math.*, 147, 1443-1480, 2021.
38. P. Deift, L.-C. Li, H. Spohn, C. Tomei and T. Trogdon, “On the open Toda chain with external forcing”, *Pure and Applied Functional Analysis*, 7, 915-945, 2022.
37. T. Chen, T. Trogdon, S. Ubaru, “Analysis of stochastic Lanczos quadrature for spectrum approximation,” *PMLR(ICML long talk)*, 130, 1–12, 2021
36. B. Deconinck, T. Trogdon and X. Yang, “The Numerical Unified Transform Method for Initial-boundary Value Problems on the Half-line”, *IMA J. on Numer. Anal.*, 1–31, 2021.
35. P. Deift and T. Trogdon, “The conjugate gradient algorithm on well-conditioned Wishart matrices is almost deterministic”, *Quarterly in Appl. Math.*, 79, 125–161, 2021.
34. D. Bilman and T. Trogdon, “On the numerical evaluation of solutions of the Korteweg-de Vries equation with discontinuous step-like data” *Nonlinearity*, 33, 2211–2269, 2020.
33. T. Trogdon, “On spectral and numerical properties of random butterfly matrices”, *Appl. Math. Lett.*, 95, 48–58, 2019.

32. P. Deift and T. Trogdon, “Universality in numerical computation with random data. Case studies and analytic results”, *J. Math Phys.*, **60**, 103306, 2019.
31. B. Deconinck, T. Trogdon and X. Yang, “Numerical inverse scattering for the sine–Gordon equation”, *Physica D*, **399**, 159–172, 2019.
30. D. Bilman and T. Trogdon, “Benchmarking numerical methods for lattice equations using the Toda lattice”, *Appl. Numer. Math.*, **141**, 19–35, 2019.
29. G. Biondini and T. Trogdon, “Evolution partial differential equations with discontinuous data”, *Quarterly in Appl. Math.*, **1–35**, 2018.
28. P. Deift and T. Trogdon, “Universality for eigenvalue algorithms on sample covariance matrices”, *SIAM J. Numer. Anal.*, **55**, 2835–2861, 2017.
27. L. Sagun, T. Trogdon and Y. LeCun, “Universal halting times in optimization and machine learning”, *Quarterly in Appl. Math.*, **76**, 289–301, 2018.
26. A. Jagannath and T. Trogdon, “Random matrices and the New York City subway system”, *Phys. Rev. E*, **96**, 030101(R), 2017.
 - Rapid communication
 - Featured in DailyMail: <http://www.dailymail.co.uk/sciencetech/article-4889216/Quantum-math-solve-NYC-s-subway-problem-researchers.html>
 - Featured in Physics magazine: <https://physics.aps.org/synopsis-for/10.1103/PhysRevE.96.030101>
 - Featured in New Scientist magazine: <https://www.newscientist.com/article/2146993-the-nyc-subway-is-most-efficient-when-it-follows-quantum-maths/>
 - Featured on Phys.org: <https://phys.org/news/2017-09-york-subway-conform-random-matrix.html>
25. P. Deift and T. Trogdon, “Universality for the Toda algorithm to compute the largest eigenvalue of a random matrix”, *Comm. Pure App. Math.*, **71**, 1–27, 2017.
24. G. Biondini and T. Trogdon, “Gibbs phenomenon for dispersive PDEs on the line”, *SIAM J. Appl. Math.*, **77**, 813–837, 2017.
23. D. Bilman and T. Trogdon, “Numerical inverse scattering for the Toda lattice”, *Comm. Math. Phys.*, **352**, 805–879, 2017.
22. G. Menon and T. Trogdon, “Smoothed analysis for the conjugate gradient algorithm”, *SIGMA*, **12** (P. Deift and C. Tracy’s 70th birthday volume), 1–22, 2016.
21. P. Deift, G. Menon and T. Trogdon, “On the condition number of the critically-scaled Laguerre Unitary Ensemble”, *DCDS-A*, **36** (Peter Lax’s 90th birthday volume), 4287–4347, 2016.
20. A. Townsend, T. Trogdon and S. Olver, “Fast computation of Gauss quadrature nodes and weights on the whole real line”, *IMA J. Numer. Anal.*, **36**, 337–358, 2016.
19. C. Bordenave, P. Germain and T. Trogdon, “An extension of the Derrida–Lebowitz–Speer–Spohn equation”, *J. Phys. A*, **48**, 1–19, 2015.
18. T. Trogdon, “On the application of GMRES to oscillatory singular integral equations,” *BIT Numer. Math.*, **55**, 591–620, 2015.

17. S. Olver, R. R. Nadakuditi and T. Trogdon, "Sampling unitary ensembles", *Random Matrices: Theory Appl.*, **4**, 1–22, 2015.
16. P. Deift, G. Menon, S. Olver and T. Trogdon, "Universality in Numerical Computations with Random Data", *PNAS*, **111**, 14973–8, 2014.
15. T. Trogdon, "Rational approximation, oscillatory Cauchy integrals and Fourier transforms", *Constr. Approx.*, **43**, 71–101, 2016.
 - Winner of the 2017 SIAM Gábor Szegő Prize.
14. T. Trogdon and S. Olver, "A Riemann–Hilbert approach to Jacobi operators and Gaussian quadrature", *IMA J. Numer. Anal.*, **36**, 174–196, 2014.
13. T. Trogdon and B. Deconinck, "Dispersive and soliton perturbations of finite-genus solutions of the KdV equation: computational results," *Physics Letters A*, **378**, 617–622, 2014.
12. S. Olver and T. Trogdon, "Numerical solution of Riemann–Hilbert problems: orthogonal polynomials and random matrix theory," *Constr. Approx.*, **39**, 101–149, 2014.
11. B. Deconinck, V. Vasan and T. Trogdon, "The Method of Fokas for Solving Linear Partial Differential Equations," *SIAM Review*, **56**, 159–186, 2014.
10. S. Olver and T. Trogdon, "Nonlinear steepest descent and the numerical solution of Riemann–Hilbert problems," *Comm. Pure Appl. Math.*, **67**, 1353–1389, 2014.
9. T. Trogdon and B. Deconinck, "A numerical dressing method for the nonlinear superposition of solutions of the KdV equation," *Nonlinearity*, **27**, 67–85, 2013.
8. T. Trogdon and B. Deconinck, "A Riemann–Hilbert problem for the finite-genus solutions of the Korteweg–de Vries equation and its numerical solution," *Physica D*, **251**, 1–18, 2013.
7. T. Trogdon and B. Deconinck, "Numerical computation of the finite-genus solutions of the Korteweg–de Vries equation via Riemann–Hilbert problems," *Appl. Math. Lett.*, **16**, 5–9, 2013.
6. S.-P. Gorza, B. Deconinck, T. Trogdon, P. Emplit, and M. Haelterman, "Neck instability of bright solitary waves in hyperbolic Kerr media," *Optics Letters*, **37**, 4657–4659, 2012.
5. T. Trogdon and S. Olver, "Numerical inverse scattering for the focusing and defocusing nonlinear Schrödinger equations," *Proc. Roy. Soc. A*, **469**, 1–23, 2012.
4. T. Trogdon, S. Olver and B. Deconinck, "Numerical inverse scattering for the Korteweg–de Vries and modified Korteweg–de Vries equations," *Physica D*, **241**, 1003–1025, 2012.
3. T. Trogdon and B. Deconinck, "The Solution of Linear Constant-Coefficient Evolution PDEs With Periodic Boundary Conditions," *Applicable Analysis*, **91**, 529–544, 2012.
2. S.-P. Gorza, P. Emplit, T. Trogdon, B. Deconinck, M. Haelterman, "Experimental demonstration of the oscillatory snake instability of the bright soliton of the (2+1)D hyperbolic nonlinear Schrödinger equation," *Phys. Rev. Lett.*, **106**, 146–149, 2011.
1. S.-P. Gorza, M. Haelterman, P. Emplit, T. Trogdon, and B. Deconinck, "Transverse Instability of Bright Solitons in Hyperbolic Dispersive Media," *Nonlinear Photonics, OSA Technical Digest*, NMD4, 1–2, 2011.

Software

- T. Trogdon, “AKNS.jl”, <https://github.com/tomtrogdon/AKNS.jl>, 2022.
 - T. Trogdon, “PeriodicKdV.jl”, <https://github.com/tomtrogdon/PeriodicKdV.jl>, 2022.
 - T. Trogdon, “ApproxFunRational.jl”, <https://github.com/tomtrogdon/ApproxFunRational.jl>, 2020.
 - T. Trogdon, “NumericalUniversality”, <https://bitbucket.org/trogdon/numericaluniversality>, 2014.
 - T. Trogdon, “ISTPackage”, <https://bitbucket.org/trogdon/istpackage>, 2013.
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Grants

- | | |
|---|-----------|
| • NSF DMS-2306438/2306439 (joint w/Xiucui Ding) | 2023-2026 |
| <i>Collaborative Research: Random Matrices and Algorithms in High Dimension</i> | \$349,978 |
| • PIMS | 2022 |
| <i>PIMS Support for the Conference on RMT + NLA</i> | \$3,000 |
| • NSF DMS-1753185, DMS-1945652 | 2018-2023 |
| <i>CAREER: Numerical Linear Algebra, Random Matrix Theory and Applications</i> | \$418,034 |
| • NSF DMS-1916492 | 2019-2020 |
| <i>NSF Graduate Support for Minorities - AGEP-GRS supplement</i> | \$59,991 |
| • NSF DMS-1743920 | 2017-2018 |
| <i>CBMS Conference</i> | \$34,999 |
| • NSF DMS-1303018 | 2013-2016 |
| <i>NSF Postdoctoral Fellowship</i> | \$150,000 |
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Editorial Boards

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|-------------------------------|--------------|
| • Mathematics of Computation | 2025-Present |
| <i>Associate Editor</i> | |
| • Journal of Nonlinear Waves | 2024-Present |
| <i>Associate Editor</i> | |
| • Applied Mathematics Letters | 2023-Present |
| <i>Associate Editor</i> | |
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Reviewer For:

- Annals of PDE
- Journal of Computational and Graphical Statistics
- ETNA
- European Journal of Applied Mathematics

- MIT Press
 - SIAM Journal on Mathematical Analysis
 - Bernoulli Journal
 - Journal of Differential Equations
 - Physica D
 - SIGMA
 - SIAM Journal on Matrix Analysis
 - Journal of Integrable Systems
 - Mathematics of Computation
 - Applied Numerical Mathematics
 - Quarterly of Applied Mathematics
 - IMA Journal of Applied Mathematics
 - Acta Applicandae Mathematicae
 - zbMath
 - Journal of Computational and Applied Mathematics
 - Proceedings of the London Mathematics Society
 - Annales de l'Institut Fourier
 - Inverse Problems
 - Communications in Mathematical Physics
 - Wave Motion
 - Advances in Computational Mathematics
 - Mathematical Proceedings of the Cambridge Philosophical Society
 - Proceedings of the Royal Society A
 - Mathematical Reviews
 - Journal of Mathematical Physics
 - Journal of Nonlinear Science
 - Constructive Approximation
 - Studies in Applied Mathematics
 - Electronic Journal of Applied Mathematics
 - Nonlinearity
 - International Mathematics Research Notices
-

Short Courses & Tutorials

3. ICML Tutorial, July 2021: “Random Matrix Theory and Machine Learning”
 2. Isaac Newton Institute Masterclass on Numerical Complex Analysis, December 2019: “RiemannHilbert.jl: Numerical complex analysis and Riemann–Hilbert problems in Julia”
 1. ICTS Conference on Integrable Systems, Condensed Matter and Statistical Physics, July 16–20, 2018: “A computational theory for Riemann–Hilbert problems”
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Invited Presentations

107. Waves 2025, Athens, GA, April 16, 2025: “On the asymptotics of Jacobi-type orthogonal polynomials on multiple intervals with non-analytic weights”
106. Mathematics Colloquium, University of Arizona, April 10, 2025: “Towards PCA without the SVD: Lanczos-based spike detection”
105. Seminar in Modeling and Computational Mathematics, University of Arizona, April 10, 2025: “Some old and new perspectives on the convergence of spectral methods”
104. Joint Math Meetings, Seattle, WA, January 11, 2025: “Applications of orthogonal polynomials in the study of random matrices and randomized algorithms”
103. Joint Meeting of the NSMS, AustMS and AMS, Auckland, NZ, December 13, 2025: “Applications of Riemann–Hilbert problems with theta-function asymptotics”
102. AMS Sectional Meeting, UC Riverside, October 26, 2025: “Applications of orthogonal polynomials in the study of random matrices and randomized algorithms”,
101. Statistics Colloquium, UC Davis, October 24, 2025: “Applications of orthogonal polynomials in the study of random matrices and randomized algorithms”
100. CMS Summer Meeting, Saskatoon, SK, June 3, 2024: “Some old and new perspectives on the convergence of spectral methods”
99. LCDS Seminar, Brown University, April 8, 2024: “Random matrices, orthogonal polynomials and iterative methods in numerical linear algebra”
98. Mathematics Department Colloquium, Oregon State University, November 27, 2023: “Random matrices, orthogonal polynomials and iterative methods in numerical linear algebra”
97. 2023 SIAM PNW Meeting, October 14, 2023: “On the stability of the Lanczos algorithm on matrices with regular spectrum”
96. Complex analysis: techniques, applications and computations - perspectives in 2023, Cambridge, UK, July 24-28, 2023: “On the numerical solution of Riemann–Hilbert problems with theta function asymptotics”
95. Foundations of Computational Mathematics, II.5 Random Matrices, Paris, France, June 15-17, 2023: “Predictability and universality in numerical computation via orthogonal polynomials and local laws”
94. Foundations of Computational Mathematics, III.4 Foundations of Numerical PDEs, Paris, France, June 19-21, 2023: “The periodic KdV equation: Computing with nonlinear Fourier series”

93. AMS Sectional Meeting, U Cincinnati, April 15-16, 2023: "Riemann-Hilbert problems on many cuts"
92. Probability Seminar, CU Boulder, April 13, 2023: "Local laws for random matrices, random orthogonal polynomials and algorithms"
91. BIRS Workshop on Perspectives on Matrix Computations, March 7, 2023: "What can random matrices tell us about algorithms?"
90. JMM 2023, Boston, MA, January 6, 2023: "Perturbations of orthogonal polynomials: Riemann-Hilbert problems, random matrices and numerical linear algebra"
89. Probability in the City, Courant Institute, October 28, 2022: "Local laws for random matrices, random orthogonal polynomials and algorithms"
88. Isaac Newton Institute, October 25, 2022: "Numerical inverse scattering for the KdV equation revisited"
87. Isaac Newton Institute, October 18, 2022: "On the Toda lattice with random matrix initial data"
86. Centre de Recherches Mathématiques Applied Math Seminar, March 29 2022: "Perturbations of orthogonal polynomials: Riemann-Hilbert problems, random matrices and numerical linear algebra"
85. Complexity of Matrix Computations, October 27, 2021 (with Christopher Musco, Andreas Stathopoulos): "Iterative solvers for eigenvalue problems"
84. MSRI Open Problems Session, October 4, 2021: "The conjugate gradient algorithm and sample covariance matrices: Universality, concentration and open questions"
83. UC Online Applied PDE Seminar, September 21, 2021: "Numerical inverse scattering for the KdV equation revisited"
82. SIAM Annual Meeting, May 23, 2021: "Numerical inverse scattering for the periodic problem for the KdV equation"
81. SIAM Conference on Linear Algebra, May 18, 2021: "Average-Case Behavior of Iterative Methods on Sample Covariance Matrices"
80. Mathematics Department Colloquium, Oregon State University, April 26, 2021: "Average-Case Behavior of Iterative Methods on Sample Covariance Matrices"
79. Applied Math Seminar, Duke University, March 2, 2021: "Average-Case Behavior of Iterative Methods on Sample Covariance Matrices"
78. CMS Winter Meeting, held virtually, December 5-6, 2020: "On arbitrary-precision enabled inverse scattering for the 1-dimensional Schrödinger operator"
77. Probability Seminar, University of Washington, November 30, 2020: "Random matrices, numerical linear algebra and universality"
76. Brown LCDS Seminar, Brown University, February 24, 2020: "The conjugate gradient algorithm on sample covariance matrices"
75. SIAM PNW Sectional Meeting, Seattle University, October 18, 2019: "The conjugate gradient algorithm on random matrices"
74. Stochastic Processes and their Applications, Northwestern, July 9, 2019: "The conjugate gradient algorithm on random matrices"
73. Probability Seminar, UCLA, May 30, 2019: "The conjugate gradient algorithm on random matrices"

72. Mathematics Colloquium, DePaul University, May 17, 2019: “Numerical linear algebra and random matrix theory”
71. Probability Seminar, UC Irvine, April 30, 2019: “The conjugate gradient algorithm on random matrices”
70. SOCAMS, Caltech, April 27, 2019: “The conjugate gradient algorithm on random matrices”
69. IMACS, Athens, GA, April 18, 2019: “Construction and evaluation of dispersive shock wave solutions”
68. Applied Math Seminar, University of Washington, Jan 29, 2018: “Numerical linear algebra and random matrix theory”
67. AMS Sectional Meeting, Ann Arbor, MI, October 20-21, 2018: “Construction and evaluation of dispersive shock wave solutions”
66. NSF-CBMS Conference, Irvine, CA, June 18-22, 2018: “A computational theory for Riemann–Hilbert problems”
65. SIAM Conference on Nonlinear Waves and Coherent Structures, Anaheim, CA, June 11-14, 2018: “Dispersive shock wave solutions of the KdV equation”
64. 36th Annual Western States Mathematical Physics Meeting, UC Irvine, February 19, 2018: “Universality for the Toda algorithm”
63. Applied Mathematics Seminar, University of Wyoming, February 16, 2018: “Riemann–Hilbert problems and the inverse scattering transform: From asymptotics to computation”
62. Special Seminar, Brandeis University, January 19, 2018: “Numerical analysis and random matrix theory”
61. Math Physics Seminar, UC Davis, November 15, 2017: “Numerical analysis and random matrix theory”
60. AMS Sectional Meeting, Riverside, CA, November 4–5, 2017: “Universality in numerical computations”
59. Fields Institute workshop on inverse scattering in one space dimension, August 8, 2017: “Riemann–Hilbert problems and the inverse scattering transform: From asymptotics to computation”
58. RANW 2017, University of Washington, August 1, 2017: “Oscillatory integrals and the AKNS scattering problem”
57. FoCM 2017, University of Barcelona, July 14, 2017: “Universality in numerical computation with random data”
56. SIAM OPSFA14, Gábor Szegő Lecture, University of Kent, July 6, 2017: “The high oscillation of special functions”
55. ICERM Workshop on Probabilistic Scientific Computation, Providence, RI, June 8, 2017: “Numerical analysis and random matrix theory”
54. IMACS, Athens, GA, March 31, 2015: “Universality for eigenvalue algorithms”
53. Probability Seminar, Courant Institute, March 24, 2017: “Numerical analysis of random matrices”
52. Working Conference on Applications of Random Matrix Theory to Data Analysis, Harvard University, January 10, 2017: “On the average-case behavior of numerical algorithms”
51. Southern California Probability Seminar, USC, December 3, 2016: “Universality in numerical computations with random data”

50. AMS Sectional Meeting, Minneapolis, MN, October 28–30, 2016: “Numerical inverse scattering for the Toda lattice”
49. AMS Sectional Meeting, Denver, CO, October 8–9, 2016: “Universality for the Toda algorithm to compute the eigenvalues of a random matrix”
48. SIAM Conference on Nonlinear Waves and Coherent Structures, Philadelphia, PA, August 8-11, 2016: “Corner Singularities, Gibbs Phenomenon and the Unified Transform Method”
47. Midwest PDE Seminar, May 7, 2016: “Corner singularities and Gibbs phenomenon in evolution PDEs”
46. Applied and Computational Mathematics Seminar, UC Irvine, April 29, 2016: “The Toda Lattice”
45. Applied Mathematics Colloquium, Johns Hopkins University, February 11, 2016: “Universality in numerical computations with random data”
44. Mathematics Seminar, North Carolina State University, February 2, 2016: “Universality in numerical computations with random data”
43. Mathematics Colloquium, Carnegie Mellon University, January 27, 2016: “Universality in numerical computations with random data”
42. Mathematics Colloquium, University of Connecticut, January 21, 2016: “Universality in numerical computations with random data”
41. Scientific Computing Seminar, Brown University, January 19, 2016: “Universality in numerical computations with random data”
40. Mathematics Colloquium, UC Irvine, January 11, 2016: “Riemann–Hilbert problems, computation and universality”
39. Joint Math Meetings, January 9, 2016: “Applications of Riemann–Hilbert problems”
38. Applied Math Seminar, University of Washington, January 4, 2016: “Universality in numerical computations with random data”
37. Applied Math Seminar, University of Minnesota, December 12, 2015: “Riemann–Hilbert problems, computation and universality”
36. Graduate Student and Postdoc Seminar, Courant Institute, November 13, 2015: “Corner singularities, Gibbs phenomenon and the Unified Transform Method”
35. Applied Math Seminar, University of Michigan, September 25, 2015: “Riemann–Hilbert problems and computation”
34. New directions in numerical computation — in honor of Nick Trefethen’s 60th birthday, Oxford, UK, August 27, 2015: “Conjugate gradient in finite-precision arithmetic and the condition number of random matrices”
33. CRM workshop on asymptotics in integrable systems, random matrices and random processes and universality — in honor of Percy Deift’s 70th birthday, CRM, June 11, 2015: “Universality in numerical computations with random data”
32. SIAM Conference on Orthogonal Polynomials and Special Functions, NIST, June 2, 2015: “Uniformly accurate computation of Painlevé II transcendents”
31. SIAM Conference on Orthogonal Polynomials and Special Functions, NIST, June 2, 2015: “The condition number of the critically-scaled Laguerre Unitary Ensemble”

30. IMACS, Athens, GA, April 1-5, 2015: “Gibbs phenomenon for dispersive PDEs on the line”
29. Numerical Analysis Seminar, Courant Institute, February 20, 2015: “Universality in numerical computations with random data”
28. Mathematics Department Seminar, Dartmouth College, February 6, 2015: “Riemann–Hilbert problems, computation and universality”
27. Modern Applications of Complex Variables, Banff International Research Station, January 13, 2015: “Gibbs phenomenon for dispersive PDEs on the line”
26. Joint Applied Math/Probability Colloquium, Columbia University, December 2, 2014: “Universality in numerical computations with random data”
25. Applied Math Colloquium, CU Boulder, November 14, 2014: “Riemann–Hilbert problems, computation and universality”
24. LCDS Seminar, Brown University, October 20, 2014: “Universality in numerical computations with random data”
23. Analysis Seminar, Courant Institute, October 16, 2014: “Gibbs phenomenon for dispersive PDEs on the line”
22. SIAM Conference on Nonlinear Waves and Coherent Structures, Cambridge, UK, August 11-14, 2014: “Gibbs-like behavior of dispersive PDEs”
21. SIAM Conference on Nonlinear Waves and Coherent Structures, Cambridge, UK, August 11-14, 2014: “Universality in numerical computations with random data”
20. SIAM Conference on Nonlinear Waves and Coherent Structures, Cambridge, UK, August 11-14, 2014: “Oscillatory integrals and integrable systems”
19. Frontiers in Computational and Applied Mathematics, NJIT, May 22-23, 2014: “Oscillatory integrals and integrable systems”
18. Applied Mathematics Seminar, Courant Institute, April 18, 2014: “Riemann–Hilbert problems and the inverse scattering transform: From asymptotics to computation”
17. Mathematical Methods Seminar, University of Washington, April 1, 2014: “Gibbs-like behavior of dispersive PDEs”
16. Sydney Random Matrix Theory Workshop, The University of Sydney, January 13, 2014: “Monte Carlo Methods and Universality in Numerical Algorithms”
15. Graduate Student and Postdoc Seminar, Courant Institute, December 13, 2013: “Riemann-Hilbert problems, orthogonal polynomials and computation”
14. Applied Mathematics Seminar, University of Illinois at Chicago, October 25, 2013: “Riemann–Hilbert problems, their numerical solution and the computation of nonlinear special functions”
13. Integrable Systems Seminar, The University of Sydney, May 9, 2013: “A numerical Riemann–Hilbert approach for the Korteweg-de Vries equation”
12. AMS Sectional Meeting, Boulder, CO, April 13-14, 2013: “A numerical Riemann–Hilbert approach for the Korteweg-de Vries equation”
11. Applied Mathematics Seminar, SUNY Buffalo, April 9, 2013: “A numerical Riemann-Hilbert approach for the Korteweg-de Vries equation”

10. IMACS, Athens, GA, March 25-27, 2013: “Numerical inverse scattering and the uniform approximation of solutions of integrable PDEs”
 9. SIAM Conference on Computational Science and Engineering, Boston, MA, February 25 - March 1, 2013: “Numerical inverse scattering: Uniformly accurate resolution of dispersion”
 8. AMS Sectional Meeting, Tucson, AZ, October 27-28, 2012: “Instabilities of the hyperbolic $(2 + 1)$ -dimensional NLS equation: Water waves and nonlinear optics”
 7. SIAM Conference on Nonlinear Waves and Coherent Structures, Seattle, WA, June 13-16, 2012: “Finite-genus solutions of integrable equations: a numerical Riemann–Hilbert approach”
 6. ICMS Workshop on Boundary-value Problems for Linear Elliptic and Integrable PDEs: theory and computation, Edinburgh, UK, May 28-June 1, 2012: “Numerical inverse scattering: uniform approximation of solutions of integrable PDEs”
 5. AMS Sectional Meeting, Honolulu, HI, March 03-04, 2012: “Uniform numerical approximation of integrable equations via Riemann–Hilbert problems”
 4. ICIAM, Vancouver, BC, July 19-22, 2011: “Numerical inverse scattering for the Korteweg–de Vries and modified Korteweg–de Vries equations”
 3. IMACS, Athens, GA, April 04-07, 2011: “Numerical inverse scattering for the Korteweg–de Vries equation”
 2. Oxford Numerical Analysis Group, February 29, 2011: “Numerical inverse scattering: the Korteweg–de Vries equation”
 1. Department of Applied Mathematics and Theoretical Physics, Cambridge, UK, February 26, 2010, guest lecture.
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Contributed Presentations and Posters

2. SIAM Annual meeting, July 9-13, 2012: “Uniform numerical approximation of solutions of integrable equations via Riemann–Hilbert problems” (presentation)
 1. SIAM Conference on Nonlinear Waves and Coherent Structures, Seattle, WA, June 13-16, 2012: “Numerical inverse scattering: Uniform approximation of solutions of integrable PDEs” (poster)
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Teaching Experience

- **AMATH 590 — Topics in Random Matrix Theory** University of Washington
Spring 2025
- **AMATH 567 — Applied Complex Analysis** University of Washington
Fall 2024
- **AMATH 568 — Adv. Method in ODEs** University of Washington
Winter 2022, 2024
- **AMATH 570 — Spectral Methods** University of Washington
Fall 2023

- **AMATH 586 — Numerical Analysis of Time-Dep. Problems** University of Washington
Spring 2020, 2021, 2022, 2023
 - **AMATH 352 — Applied Linear Algebra** University of Washington
Summer 2012; Fall 2019
 - **AMATH 351 — Ordinary Differential Equations** University of Washington
Summer 2011
 - **MATH 225A — Numerical Analysis (Approximation Theory)** UC Irvine
Fall 2018
 - **MATH 296 — Intro. to Random Matrix Theory** UC Irvine
Winter 2018
 - **MATH 205ABC — Intro. to Graduate Analysis** UC Irvine
Fall-Spring 2017/18
 - **MATH 225C — Numerical Linear Algebra** UC Irvine
Spring 2017
 - **MATH 3A — Linear Algebra** UC Irvine
Winter 2017; Fall 2018
 - **MATH 105A & 105LA — Numerical Analysis** UC Irvine
Fall 2016
 - **MATH-UA 123 — Calculus III** New York University
Spring 2016, Fall 2014
 - **MATH-UA 233 — Theory of Probability** New York University
Fall 2015
 - **MATH-UA 140 — Linear Algebra** New York University
Spring 2015
-

Supervised dissertations

- **Tyler Chen** 2020-2022
Random matrices and Krylov subspace methods UW, PhD, 2022
 - **John Peca-Medlin** 2016-2022
Random butterfly matrices UCI, PhD, 2022
 - **Xin Yang** 2016-2020
Numerical solution of Riemann-Hilbert problems UW, PhD, 2020
 - **Yiting Zhang** 2021-present
Iterative methods and random matrices UW, PhD, post-general
 - **Cade Ballew** 2022-present
Riemann-Hilbert methods for orthogonal polynomials UW, PhD, post-general
 - **Kaitlynn Lilly** 2023-present
Generalized transform pairs UW, PhD
 - **Charbel Abi Younes** 2022-present
Lanczos methods in random matrix theory UW
 - **Wietse Vaes** 2023-present
Semi-group methods for the numerical solution of PDEs UW
 - **Catherine Johnston** 2023-present
Generalizations of the UTM method UW
-

Other Mentoring

- **Anne Liu** 2021-Present
Fourier methods for dispersive equations UW, research
 - **Roshan Mandayam** 2016-Present
Probability, coding, linear algebra research Irvine High, research
 - **Yiting Zhang** 2018-2019
Linear algebra and random matrices UCI, Undergraduate research
 - **Tatsuya Ishizuka** 2018
Measure-theoretic probability UCI, Undergraduate reading course
 - **Brigitte Anne Li** 2018
Numerical linear algebra UCI, Undergraduate reading course
 - **Abigale Dora-Churaman** 2018
Numerical linear algebra NYU, Undergraduate reading course
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Departmental Service

- **Graduate Admissions Committee Chair** AY 2020, 2021, 2022, 2023, 2024
Chair
 - **Tenure-Track Hiring Committee** AY 2022, 2024
Chair
 - **Seminar in Applied Mathematics Committee** AY 2022, 2023
Member
 - **Tenure-Track Hiring Committee** AY 2020
Member
 - **Open-Rank Hiring Committee** AY 2020
Member
 - **AMATH 584-585-586 Redesign Committee** AY 2021
Member
 - **AMATH 301 Language Selection Committee** AY 2019
Member
-

Service to the Profession

- **Secretary** SIAM OPSF
2025-2027
- **Secretary** SIAM PNW Section
2022-2024
- **NSF Panelist** 2022
Alexandria, VA
- **Organizer** Conference on Random Matrix Theory and Numerical Linear Algebra
Seattle, WA 2022
- **Session Chair** ICML
Learning theory 13 2021

- **Minisymposium Organizer** SIAM Annual Meeting
2021
Asymptotics and numerics in the theory of nonlinear waves
 - **Minisymposium Organizer** SIAM LA
2021
Random matrix theory and numerical linear algebra
 - **Organizing Committee Member** SIAM Annual Meeting
2021
Spokane, WA
 - **Organizing Committee Member** PNWNAS 2020
2020
Zoom
 - **Organizing Committee Member** SIAM OPSFA15 Conference
2019
Johannes Kepler University
 - **Organizing Committee Member** NSF-CBMS Conference
2018
UC Irvine
 - **Organizing Committee Member** SIAM NWCS Conference
2018
Anaheim, CA
 - **NSF Panelist** 2018
Alexandria, VA
 - **Founding Faculty Advisor** SIAM Student Chapter
2017
UC Irvine
 - **Special Session Organizer** AMS Western Sectional Meeting
Fall 2017
UC Riverside
 - **Minisymposium Organizer** SIAM OPSFA
2015
Riemann–Hilbert Problems: Orthogonal Polynomials and Random Matrix Theory
 - **Minisymposium Organizer** SIAM OPSFA
2015
Riemann–Hilbert Problems: Differential Equations
 - **SIAM Student Chapter** University of Washington
Fall, 2011–Summer, 2012
Vice President
 - **Math Fair** Lockwood Elementary
Fall, 2010–Spring, 2012
Volunteer
 - **Minisymposium Organizer** SIAM Nonlinear Waves
2012
Riemann–Hilbert problems: analysis and computation
-

Membership in Professional Societies

- Member of AMS (American Mathematical Society)
- Member of MAA (Mathematics Association of America)
- Member of SIAM (Society for Industrial and Applied Mathematics)
 - Member of the SIAM Activity Group on Computational Science and Engineering
 - Member of the SIAM Activity Group on Special Functions and Orthogonal Polynomials
 - Member of the SIAM Activity Group on Nonlinear Waves and Coherent Structures
 - Member of the SIAM Activity Group on Dynamical Systems