Cade Ballew

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cade-b.github.io

Education

University of Washington

- Ph.D. in Applied Mathematics 2021–2026 (Expected)
  - Advisor: Tom Trogdon.
- M.S. in Applied Mathematics 2021–2022

Rice University

- B.A., *magna cum laude* 2017–2021
  - Majors: Computational and Applied Mathematics; Mathematical Economic Analysis
  - Minor: Mathematics

Publications and Preprints

Publications

1. C. Ballew and T. Trogdon. A Riemann–Hilbert approach to computing the inverse spectral map for measures supported on disjoint intervals. *Studies in Applied Mathematics*, 152(1):31–72, 2024.

Preprints

3. C. Ballew, D. Bilman, and T. Trogdon. Efficient computation of soliton gas primitive potentials. *arXiv preprint 2505.02029*, 2025.
2. C. Ballew, T. Trogdon, and H. Wilber. The Akhiezer iteration and an inverse-free solver for Sylvester matrix equations. *arXiv preprint 2503.17496*, 2025.
1. C. Ballew and T. Trogdon. The Akhiezer iteration. *arXiv preprint 2312.02384*, 2023.

Software

2. C. Ballew, D. Bilman, and T. Trogdon. `https://github.com/cade-b/KdVSolitonGas.jl`, 2025.
1. C. Ballew and T. Trogdon. `https://github.com/cade-b/RecurrenceCoefficients.jl`, 2023.

Invited Talks

10. *Computing KdV soliton gas potentials.* The Thirteenth International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, GA, April 2025.
9. *Polynomials: Better than you think.* Workshop on Challenges, Opportunities, and New Horizons in Rational Approximation, Banff International Research Station, April 2025.
8. *Computing KdV soliton gas potentials.* AMS Spring Central Sectional Meeting, University of Kansas, March 2025.
7. *The Akhiezer iteration for matrix functions and Sylvester equations.* SIAM Conference on Computational Science and Engineering, Fort Worth, TX, March 2025.

6. *Some numerical applications of Riemann–Hilbert problems.* Joint Mathematics Meetings, Seattle, WA, January 2025.

5. *Numerical solutions of Riemann–Hilbert problems on disjoint intervals.* Integrable Systems and Random Matrix Theory Seminar, University of Michigan, October 2024.

4. *Orthogonal polynomials and Geronimus's theorem.* Arbeitsgemeinschaft on Quantum Signal Processing and Nonlinear Fourier Analysis, Oberwolfach Research Institute for Mathematics, October 2024.

3. *Applications of numerical solutions of Riemann–Hilbert problems on disjoint intervals.* SIAM Conference on Nonlinear Waves and Coherent Structures, Baltimore, MD, June 2024.

2. *Numerical solutions of Riemann–Hilbert problems on disjoint intervals.* CMS Summer Meeting, University of Saskatchewan, June 2024.

1. *Computing with orthogonal polynomials on disconnected domains.* SIAM PNW Biennial Meeting, Western Washington University, October 2023.

Posters

2. *Computing with orthogonal polynomials for integrable systems: A Riemann-Hilbert approach.* SIAM Conference on Nonlinear Waves and Coherent Structures, Baltimore, MD, June 2024.

1. *Computing with orthogonal polynomials on disconnected domains: A Riemann–Hilbert approach.* Workshop on complex analysis: techniques, applications and computations, Isaac Newton Institute, July 2023.

Conference organization

3. Session co-organizer, Joint SIAM/CAIMS Annual Meetings, Minisymposium on "Numerical methods in the theory of orthogonal polynomials and special functions", Montréal, QC, July 2025.

2. Session co-organizer, Joint Mathematics Meetings 2025, AMS Special Session on "Recent Advancements in Integrable Systems and Orthogonal Polynomials", Seattle, WA, January 2025.

1. Session co-organizer, SIAM PNW Biennial Meeting, Session on "Scientific Computing and Numerical Analysis", Western Washington University, Bellingham, WA, October 2023.

Teaching Experience

University of Washington

- Instructor of Record, AMATH 353 (Partial Differential Equations and Waves), Summer 2024.
- Teaching Assistant, AMATH 502 (Applied Complex Analysis), Winter 2025.
- Teaching Assistant, AMATH 567 (Applied Complex Analysis), Autumn 2023, Autumn 2024.
- Teaching Assistant, CFRM 507 (Optimization Methods in Finance), Autumn 2021, Autumn 2022.

Rice University

- Grader, CAAM 336 (Differential Equations in Science and Engineering), Spring 2019.

Service

- SIAM UW Student Chapter
  - Vice President 2022–2023
  - Outreach Coordinator 2023–2024
- Numerical Analysis Research Club
  - Student organizer Spring 2023, Autumn 2023

Awards

- Kevorkian Fellowship 2025
- Wan Fellowship 2021–2024
- SIAM CSE Student Travel Award 2025
- US Junior Oberwolfach Fellows NSF grant 2024
- SIAM NWCS Student Travel Award 2024
- CMS Student Travel Award 2024
- SIAM PNW Student Travel Award 2023
- Phi Beta Kappa 2021
- Peter Mieszkowski Prize for Honors Program Research 2021
- Malcolm Gillis Award in Mathematical Economic Analysis 2021
- Honors in Economics 2021
- Louis J. Walsh Scholarship 2020–2021
- Michael D. Maher RISE Award in Economics 2020
- Rice University President's Honor Roll (5 semesters)