

Heather D. Wilber

EDUCATION

Cornell University, Ithaca, NY PhD, Applied Mathematics May 2021

Advisor: Prof. Alex Townsend

DISSERTATION: [Computing numerically with rational functions.](#)

(Awarded [AWM Dissertation Prize](#) 2022, [Householder Prize](#) 2022)

Boise State Univ., Boise, ID M.S., Mathematics Aug 2016

Advisor: Prof. Grady Wright

THESIS: [Numerical computing with functions on the sphere and disk.](#)

(Selected as [Distinguished Thesis](#) in STEM for 2016-2017)

Boise State Univ., Boise, ID B.S., Mathematics Dec 2007

Boise State Univ., Boise, ID B.A., English-Linguistics Dec 2007

CURRENT POSITION

Oden Institute, University of Texas at Austin: NSF postdoctoral fellow, July 2021-present

PUBLICATIONS

6. Wilber, H., Damle, A., Townsend, A. [Data-driven algorithms for signal processing with trigonometric rational functions](#). *SISC*, to appear, (2022).
5. Rubin, D., Townsend, A., Wilber, H. [Bounding Zolotarev numbers using Faber rational functions](#). *Constructive Approx.*, submitted, (2020).
4. Quinn, K., Wilber, H., Townsend, A., Sethna, J.P. [Chebyshev approximation and the global geometry of model predictions](#). *Phy. Rev. Let.*, 122(15), 158302 (2019).
3. Townsend, A., Wilber, H. [On the singular values of matrices with high displacement rank](#). *Linear Alg. Appl.*, V. 548, 19-41 (2018).
2. Wilber, H., Townsend, A., Wright, G. [Computing with functions in spherical and polar geometries II. The disk](#). *SIAM J. Sci. Comput.*, 39-3, C238-C262 (2017).
1. Townsend, A., Wilber, H., Wright, G. [Computing with functions in spherical and polar geometries I. The sphere](#). *SIAM J. Sci. Comput.*, 38-4, C403-C425 (2016).

INVITED TALKS

6. HOUSEHOLDER XXI: HOUSEHOLDER PRIZE PLENARY LECTURE (Bari, Italy)
Talk: The low rank properties of structured matrices: a rational explanation (June, 2022)
5. [CAVID:COMPLEX ANALYSIS VIDEO SEMINAR SERIES](#) (virtual)
Talk: Low rank numerical methods via rational function approximation (June, 2022)
4. UNIV. DELAWARE NUMERICAL ANALYSIS AND PDE SEMINAR (virtual)
Talk: Low rank methods for structured matrices. (May, 2022)
3. UNIV. TEXAS LIBRARIES NATIONAL POETRY MONTH EVENT (virtual)
Talk: [The poetry of math and the math of poems](#) (April 2022)
2. BOISE STATE UNIV. MATHEMATICS COLLOQUIUM (BSU, Boise, ID)
Talk: Low rank methods for structured matrices. (Feb. 2022)
1. CCM SEMINAR SERIES, FLATIRON INSTITUTE (virtual)
Talk: Designing low rank methods for matrices with displacement structure. (May 2021)

SELECTED PRESENTATIONS

16. [RISING STARS](#) 2022 (Sandia Labs, Albuquerque, NM)
Talk: Data-driven computing with trigonometric rational functions (April 2022)
15. 2021 CONFERENCE ON FAST DIRECT SOLVERS (virtual)
Talk: Designing low rank methods for matrices with displacement structure. (Oct. 2021)

14. GAMM 2021 (virtual)

Talk: *Compression properties and rank-structured solvers for Toeplitz, Vandermonde and related linear systems (March 2021)*

13. SIAM ANNUAL MEETING (virtual)

Talk: *Computing with rational approximations with applications in signal processing (July 2020)*

12. 27th BIENNIAL NUMERICAL ANALYSIS CONFERENCE (Univ. of Strathclyde, Strathclyde, UK)

Talk: *Compression properties in rank-structured solvers for Toeplitz linear systems (June 2019)*

awarded SIAM UKIE prize: Best student presentation

11. APPROXIMATION THEORY 16 (Vanderbilt University, Nashville, TN)

Talk: *Rational approximation in superfast rank-structured solvers (May 2019)*

10. EPFL Numerical Analysis Group (EPFL, Lausanne, Switzerland)

Talk: *Numerical computing in polar and spherical geometries (Dec. 2018)*

9. EPFL Numerical Analysis Group (EPFL, Lausanne, Switzerland)

Talk: *On the singular values of matrices with high displacement rank (Nov. 2018)*

8. ICOSAHOM (Imperial College London, UK)

Talk: *A low rank and spectrally accurate elliptic PDE solver (July 2018)*

7. SIAM CONF. ON COMPUTATIONAL SCIENCE AND ENGINEERING (Atlanta, GA)

Talk: *A factored ADI method for Sylvester equations with high-rank right-hand sides (Feb. 2017)*

6. SIAM CONF. ON COMPUTATIONAL SCIENCE AND ENGINEERING (Atlanta, GA)

Poster: *Numerical computing with functions in spherical and polar geometries (Feb. 2017)*

5. WORKSHOP ON FAST DIRECT SOLVERS (Purdue Univ., Lafayette, IN)

Talk: *Numerical computing with functions on the sphere and disk (Nov. 2016)*

4. SCIENTIFIC COMPUTING AND NUM. ANALY. SEMINAR (Cornell University, Ithaca, NY)

Talk: *Numerical computing with functions on the sphere and disk (Sept. 2016)*

3. SIAM ANNUAL MEETING (Boston, MA)

Talk: *Numerical computing in polar and spherical geometries (July 2016)*

2. OXFORD NUM. ANALY. GROUP SEMINAR (University of Oxford, Oxford, UK)

Talk: *Computing with functions on the sphere and disk (July 2016)*

1. PACIFIC NORTHWEST NUMERICAL ANALYSIS SEMINAR

Poster: *Computing with functions on the sphere and disk (Oct. 2015)*

SOFTWARE DEVELOPMENT

- [REfit](#)

Open-source code for computing with trigonometric rational functions and exponential sums

- [freeLyap](#) Iterative solvers package

Open-source code for solving Sylvester and Lyapunov matrix equations

- [CHEBFUN PROJECT](#)

Spherefun and *Diskfun* in the open-source project *Chebfun*

SELECTED FELLOWSHIPS AND AWARDS

- [Householder Prize](#) (2022)

- [AWM Dissertation Prize](#) (2022)

- National Science Foundation Mathematical Sciences Postdoctoral Research Fellowship (2021)

- SIAM UKIE prize: Best student presentation, 27th Biennial Numerical Analysis conference (2019)

- National Science Foundation Graduate Research Fellowship (NSF GRF) (2016)

- [Distinguished Thesis Award](#) (2017)

- [National Aeronautics and Space Administration \(NASA\) Fellowship Award](#) (2015-2016)

PROFESSIONAL ACTIVITIES

- Referee: SIAM J. Scientific Computing, J. Comp. Physics, IMA J. of Num. Analysis, Arkiv der Mathematik, BIT numerical methods, J. of Scientific Comp.

- Minisymposium organizer and co-chair, SIAM AN2022, (Pittsburgh, PA)

July 2022

- Consultant: [X-prize Carbon removal competition](#) with [Ecorestoration Alliance team](#) 2022
- Minisymposium organizer and co-chair, SIAM AN2020, (Virtual) July 2020
- AWM outreach mentor 2019
- Rural schools outreach volunteer with NASA STEM Mathematics Initiative 2015-2016

TEACHING EXPERIENCE

Cornell University

Ithaca, NY

August 2020-Dec. 2020

Instructor

- Spring 2021: Teaching Assistant for Prof. Steven Strogatz, Mathematical Explorations
- Fall 2020: Teaching Assistant for Prof. Alex Townsend, Linear Algebra for Engineers

Boise State University

Boise, Idaho

August 2014-May 2015

Instructor

- Spring 2015: Analytic Trigonometry
- Spring 2015: Trigonometry project and assessment design team member
- Fall 2014: Analytic Trigonometry, College Algebra.