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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)

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 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 ands 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).*

PRESENTATIONS

19. 2021 CONFERENCE ON FAST DIRECT SOLVERS (virtual)
Talk: Designing low rank methods for matrices with displacement structure. (Oct. 2021)
18. CCM SEMINAR SERIES, FLATIRON INSTITUTE (virtual)
Talk: Designing low rank methods for matrices with displacement structure. (May 2021)
17. GAMM 2021 (virtual)
Talk*: Compression properties and rank-structured solvers for Toeplitz, Vandermonde and related linear systems (March 2021)*
16. SIAM ANNUAL MEETING (virtual)
Talk*: Computing with rational approximations with applications in signal processing (July 2020)*

15. 27th BIENNIAL NUMERICAL ANALYSIS CONFERENCE (Univ. of Strathclyde, Strathclyde, UK)
Talk*: Compression properties in rank-structured solvers for Toeplitz linear systems (June 2019)*
Talk awarded SIAM UKIE prize: Best student presentation
14. APPROXIMATION THEORY 16 (Vanderbilt University, Nashville, TN)
Talk*: Rational approximation in superfast rank-structured solvers (May 2019)*
13. SCIENTIFIC COMPUTING AND NUM. ANALY. SEMINAR (Cornell University, Ithaca, NY)
Talk*: Compression properties in rank-structured Toeplitz solvers (April 2019)*
12. EPFL Numerical Analysis Group (EPFL, Lausanne, Switzerland)
Talk*: Numerical computing in polar and spherical geometries (Dec. 2018)*
11. EPFL Numerical Analysis Group (EPFL, Lausanne, Switzerland)
Talk*: On the singular values of matrices with high displacement rank (Nov. 2018)*
10. ICOSAHOM (Imperial College London, UK)
Talk*: A low rank and spectrally accurate elliptic PDE solver (July 2018)*
9. SCIENTIFIC COMPUTING AND NUM. ANALY. SEMINAR (Cornell University, Ithaca, NY)
Talk*: On the singular values of matrices with high displacement rank (Oct. 2017)*
8. CORNELL SCIENTIFIC SOFTWARE CLUB (Cornell University, Ithaca, NY)
Talk*: Computing with functions in Chebfun (Oct. 2017)*
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. ANALYS. 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*

FELLOWSHIPS AND AWARDS

- AWM Dissertation Prize (2022)
- National Science Foundation Mathematical Sciences Postdoctoral Research Fellowship (2021)
- SIAM Student Travel Award (2020) *Ultimately, I did not accept award as conference proceeded virtually and no funding was required.
- SIAM UKIE prize: Best student presentation, 27th Biennial Numerical Analysis conference (2019)
- Cornell University Dean's Excellence Fellowship (2016-2017)
- National Science Foundation Graduate Research Fellowship (NSF GRF) (2016)
- Distinguished Thesis Award (2017)
- SIAM Student Travel Award (2016)

- National Aeronautics and Space Administration (NASA) Fellowship Award (2015-2016)
- Boise State Univ., Graduate Residential Scholars Fellowship Award (2014-2016)
- Boise State Univ., Summer Research Fellowship Award (2015)

PROFESSIONAL ACTIVITIES

- Referee: SIAM J. Scientific Computing, J. Comp. Physics, IMA J. of Num. Analysis, Archiv der Mathematik
- Minisymposium co-chair, SIAM Annual Meeting 2020, (Virtual). 2020
- Expanding Your Horizons outreach mentor 2019
- Rural schools outreach volunteer with National Aeronautics and Space Administration, Science, Technology, Engineering and Mathematics Initiative (NASA STEM) 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

Bruneau-Grandview School District **Bruneau, Idaho** **August 2013-August 2014**

High School Math Teacher

- pre-algebra, algebra II, geometry, trigonometry, pre-calculus and Title-I interventionist