Tyler Chen

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https://chen.pw

Education

University of Washington ..... *2017 - Present*

Ph.D. in Applied Mathematics

- My research centers on the design and analysis of numerical linear algebraic algorithms. I am particularly interested in algorithms related to the Lanczos method.

University of Washington ..... *2017 - 2019*

M.Sc. in Applied Mathematics

Tufts University ..... *2013 - 2017*

B.S. Summa Cum Laude in Mathematics and Physics; Minor in Studio Art

Publications

[5] Tyler Chen, Anne Greenbaum, Cameron Musco, and Christopher Musco. "Error bounds for Lanczos-based matrix function approximation". In: *SIAM Journal on Matrix Analysis and Applications* (To appear) (2021). [arXiv: 2106.09806] [intro]

[4] Anne Greenbaum, Hexuan Liu, and Tyler Chen. "On the Convergence Rate of Variants of the Conjugate Gradient Algorithm in Finite Precision Arithmetic". In: *SIAM Journal on Scientific Computing* (July 2021), S496–S515. [arXiv: 1905.05874] [intro]

[3] Tyler Chen, Thomas Trogdon, and Shashanka Ubaru. "Analysis of stochastic Lanczos quadrature for spectrum approximation". In: *Proceedings of the 38th International Conference on Machine Learning*. Vol. 139. Proceedings of Machine Learning Research. PMLR, 18–24 Jul 2021, pp. 1728–1739. [arXiv: 2105.06595] [intro]

- selected for long presentation (top 3%)

[2] Tyler Chen. "Non-asymptotic moment bounds for random variables rounded to non-uniformly spaced sets". In: *Stat* (June 2021), e395. [arXiv: 2007.11041] [intro]

[1] Tyler Chen and Erin C. Carson. "Predict-and-recompute conjugate gradient variants". In: *SIAM Journal on Scientific Computing* 42.5 (Jan. 2020), A3084–A3108. [arXiv: 1905.01549] [intro]

- abridged version was Student Paper Competition winner at 16$^{\text{th}}$ Copper Mountain Conference on Iterative Methods

In progress/submission

[3] Tyler Chen, Anne Greenbaum, Cameron Musco, and Christopher Musco. *Optimal low-memory rational matrix function approximation*. 2021.

[2] Tyler Chen and Thomas Trogdon. *Average case behavior of the Lanczos algorithm in finite precision arithmetic*. 2021.

[1] Tyler Chen, Thomas Trogdon, and Shashanka Ubaru. *Randomized matrix-free quadrature*. 2021.

Teaching

Instructor, Applied Linear Algebra and Numerical Analysis (UW AMATH 352) ..... *Spring 2021*

Instructor, Interdisciplinary Writing/Natural Science (UW ENGL 199) ..... *Winter 2021*

Instructor, Interdisciplinary Writing/Natural Science (UW ENGL 199) ..... *Autumn 2020*

TA, Probability and Statistics for Computational Finance (UW CFRM 410) ..... *Winter 2019*
TA, Calculus with Analytic Geometry I (UW MATH 124) ..... *Autumn 2018*
TA, Calculus with Analytic Geometry II (UW MATH 12) ..... *Winter 2018*
TA, Calculus with Analytic Geometry II (UW MATH 125) ..... *Autumn 2017*
Lab TA, Electronics (Tufts PHY 41) ..... *Spring 2017*
Lab TA, Electronics (Tufts PHY 41) ..... *Spring 2016*
Grader, Discrete Mathematics (Tufts MATH 61) ..... *Spring 2016*
Grader, Calculus III (Tufts MATH 42) ..... *Fall 2015*
Grader, Differential Equations (Tufts MATH 51) ..... *Spring 2015*
Grader, Calculus III (Tufts MATH 42) ..... *Fall 2014*

Awards & Honors

Boeing Research Award (UW Department of Applied Mathematics) *2020*
Student Paper Competition Winner (Copper Mountain Conference on Iterative Methods) *2020*
Graduate Research Fellowship (NSF) *2019*
Top Scholars Fellowship (UW) *2017*
The Audrey Butvay Gruss Science Award (Tufts) *2017*
The Howard Sample Prize Scholarship in Physics (Tufts) *2015*

Talks and Posters

[6] *Analysis of stochastic Lanczos quadrature for spectrum approximation*. Oral at ICML. July 2021. [video]

[5] *Concentration in the Lanczos Algorithm*. Presentation at SIAM Linear Algebra 21. May 2021. [pdf]

[4] *Analysis of stochaschastic Lanczos quadrature for spectrum approximation*. Presentation at at Baidu Research. Mar. 2021.

[3] *Analyzing the Effects of Local Roundoff Error on Predict-and-Recompute Conjugate Gradient Variants*. Poster at Householder Symposium (Cancelled). June 2020. [pdf]

[2] *Predict-and-recompute conjugate gradient variants*. Presentation at Copper Mountain Student Paper Award Session (Cancelled). Mar. 2020. [pdf]

[1] *Predict-and-recompute conjugate gradient variants*. Presentation at SIAM Parallel Processing. Feb. 2020. [pdf]

Service and Outreach

Minisymposium Organizer ..... *May 2021*

Random matrices and numerical linear algebra (at SIAM Linear Algebra 21, co-organized with Thomas Trogdon) [program]

Graduate Student Representative ..... *2019 - 2020*

Represent interests of graduate students to the department

Minisymposium Organizer ..... *Feb. 2020*

High performance Krylov subspace methods: Theory, Implementation, and Application (at SIAM Parallel Processing 20) [program]

Diversity Committee Departmental Climate Orientation ..... *Oct. 2019*

Pannelist for event focused on building an inclusive department culture

Washington Directed Reading Program ..... *Autumn 2019*

Mentor undergraduate student in independent reading project

Numerical Analysis Research Club *2019-2020*
Organize and plan weekly meetings for NARC

SIAM UW Mental Health Conversation and Resources ..... *Oct. 2018*
Organize and facilitate a discussion about mental health in grad school

Software

PETSc (`https://www.mcs.anl.gov/petsc/`)
Contribute `PIPEPRCG`. This method can be used by with the flag `-ksp_type pipeprcg`.