

ERIC HALLMAN

Department of Mathematics
North Carolina State University, Raleigh, NC
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EDUCATION

University of California, Berkeley

PhD in Applied Mathematics, May 2019

- PhD advisor: Dr. Ming Gu
- PhD thesis: “Error Estimates for Least-Squares Problems”

University of Chicago

BS in Mathematics with Minor in Linguistics, 2014

ACADEMIC APPOINTMENTS

North Carolina State University

(August 2019–)

Department of Mathematics

Postdoctoral Researcher

- Group led by Dr. Pierre Gremaud
- Research topics: randomized roundoff error analysis; backward error estimation; multilevel Monte Carlo methods; stochastic trace estimation; active subspaces; matrix sketching

RESEARCH AREAS

General: Numerical analysis and scientific computing; numerical linear algebra

Specific: Stopping criteria for iterative linear solvers; Krylov subspace methods; randomized matrix sketching; randomized roundoff error analysis; trace estimation

SERVICE

Reviewer Services: Served as referee for Applied Math and Computation (AMC); Journal of Machine Learning Research (JMLR); Numerische Mathematik; IEEE Journal of Selected Topics in Signal Processing (JSTSP); SIAM Journal on Matrix Analysis and Applications (SIMAX)

Outreach: Volunteer at 2020 and 2021 [Teacher Outreach Workshop](#); volunteer for Julia Robinson Mathematics Festival; volunteer at BugFest 2019

STUDENTS

Work with undergraduate students:

- Research mentor for Devon Troester (2020–)
- Research co-mentor for Johnathan Rhyne (2021–)
- Research co-mentor for Megan Pryor (2021)

TEACHING

North Carolina State University

(August 2019–)

Department of Mathematics

Course #	Subject	Semester
MA 402	Mathematics of Scientific Computing	Fall 2021
MA 402	Mathematics of Scientific Computing	Spring 2021
MA 402	Mathematics of Scientific Computing	Fall 2020
MA 402	Mathematics of Scientific Computing	Spring 2020
MA 114	Introduction to Finite Mathematics with Applications	Fall 2019

University of California, Berkeley

(2014–2019)

Department of Mathematics

Course #	Subject	Semester	
Math 98	Introduction to MATLAB	Spring 2019	Instructor
Math 128B	Numerical Analysis	Spring 2019	TA
Math 98	Introduction to MATLAB	Fall 2018	Instructor
Math 128A	Numerical Analysis	Fall 2018	TA
Math 55	Discrete Mathematics	Summer 2018	Instructor
Math 98	Introduction to MATLAB	Spring 2018	Instructor
Math 128A	Numerical Analysis	Spring 2018	TA
Math 1B	Calculus	Fall 2017	TA
Math 110	Linear Algebra	Spring 2017	TA
Math 54	Linear Algebra and Differential Equations	Fall 2016	TA
Math 53	Multivariable Calculus	Spring 2016	TA
Math 221	Advanced Matrix Computations	Spring 2016	TA
Math 55	Discrete Mathematics	Fall 2015	TA
Math 55	Discrete Mathematics	Summer 2015	Instructor
Math 1B	Calculus	Spring 2015	TA
Math 1A	Calculus	Fall 2014	TA

PUBLICATIONS**Peer-reviewed journal articles:**

- [1] **Eric Hallman** and Devon Troester. A multilevel approach to stochastic trace estimation. In revision, 2021. <https://arxiv.org/pdf/2103.10516.pdf>
- [2] **Eric Hallman**. A block bidiagonalization method for fixed-accuracy low-rank matrix approximation. In revision, 2021. <https://arxiv.org/pdf/2101.01247.pdf>
- [3] **Eric Hallman**. Faster stochastic trace estimation with a Chebyshev product identity. Applied Mathematics Letters 120, 107246, 2021. <https://arxiv.org/pdf/2101.00325.pdf>
- [4] **Eric Hallman**. Estimating the backward error for the least-squares problem with multiple right-hand sides. Linear Algebra and its Applications 605, 227-238, 2020.
- [5] **Eric Hallman**. Sharp 2-Norm error bounds for LSQR and the conjugate gradient method. SIAM Journal on Matrix Analysis and Applications 41 (3), 1183-1207, 2020.
- [6] **Eric Hallman** and Ming Gu. LSMB: minimizing the backward error for least-squares problems. SIAM Journal on Matrix Analysis and Applications 39 (3), 1295-1317, 2018.

PhD thesis:

- [7] **Eric Hallman**. Error estimates for least-squares problems. PhD thesis. University of California, Berkeley. 2019.

Preprints:

- [8] Hussam Al Daas, Grey Ballard, Paul Cazeaux, **Eric Hallman**, Agnieszka Miedlar, Mirjeta Pasha, Tim W. Reid, and Arvind K. Saibaba. Randomized algorithms for rounding in the Tensor-Train format. 2021. <https://arxiv.org/abs/2110.04393>
- [9] **Eric Hallman** and Ilse Ipsen. Deterministic and probabilistic error bounds for floating point summation algorithms. 2021. <https://arxiv.org/pdf/2107.01604.pdf>
- [10] **Eric Hallman**. A refined probabilistic error bound for sums. 2021. <https://arxiv.org/pdf/2104.06531.pdf>

TALKS AND PRESENTATIONS

1. *Conference presentation.* **Eric Hallman**. A block bidiagonalization method for fixed-precision low-rank matrix approximation. SIAM Conference on Applied Linear Algebra. May 2021. Talk delivered remotely.
2. *Seminar talk.* **Eric Hallman**. Sharp 2-norm error bounds for the conjugate gradient method and LSQR. SAMSI Postdoctoral Fellow Seminar. September 2020. Talk delivered remotely.
3. *Conference presentation.* **Eric Hallman**. Sharp 2-norm error bounds for the conjugate gradient method and LSQR. Householder Symposium XXI. June 2020 (*postponed to June 2022*). Selva di Fasano, Italy.
4. *Seminar talk.* **Eric Hallman**. Sharp 2-norm error bounds for LSQR and the gradient method. NA Seminar. October 2019. North Carolina State University.
5. *Seminar talk.* **Eric Hallman**. Adapting Craig’s method for least-squares problems. Linear Algebra and Optimization Seminar. November 2018. Stanford University.
6. *Seminar talk.* **Eric Hallman**. LSMB: minimizing the backward error in iterative methods for least-squares problems. Linear Algebra and Optimization Seminar. October 2016. Stanford University.

HONORS AND AWARDS

- Outstanding GSI Award, UC Berkeley, 2016

COMPUTER SKILLS

- Proficient: MATLAB
- Familiar: Python, R, C, MPI, OpenMP, Perl