Anil Damle

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Cornell University
Ithaca, NY 14853
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Current position

Cornell University **7/2017 -**

Assistant Professor, Department of Computer Science

Field membership: Computer Science, Applied Mathematics, Mathematics, and Computational Science and Engineering

Prior positions

University of California, Berkeley **7/2016 - 7/2017**

NSF Postdoctoral Fellow, Department of Mathematics

Education

Stanford University **9/2011 - 6/2016**

Ph.D. Computational and Mathematical Engineering

Thesis title: Sparse representations and fast algorithms for Kohn-Sham orbitals

Adviser: Lexing Ying

University of Colorado Boulder **8/2006 - 5/2011**

M.S. Applied Mathematics

Thesis title: Near optimal rational approximations of large data sets

Adviser: Gregory Beylkin

B.S. Applied Mathematics / Electrical and Computer Engineering
Engineering Honors Program

Submitted preprints

Kangbo Li, Hsin-Yu Ko, Robert A DiStasio Jr, and Anil Damle "An unambiguous and robust formulation for Wannier localization," *arXiv preprints*, arXiv:2305.09929, 2023

Wenyun Zuo, Anil Damle, and Shripad D Tuljapurkar "Sensitivity and uncertainty in the Lee-Carter mortality model," *bioRxiv preprints*, 2023

John Paul Ryan and Anil Damle "Linear Time Kernel Matrix Approximation via Hyperspherical Harmonics," *arXiv preprints*, arXiv:2202.03655, 2022

Austin R. Benson, Anil Damle, and Alex Townsend "Over-parametrized neural networks as under-determined linear systems," *arXiv preprints*, arXiv:2010.15959, 2020

Vasileios Charisopoulos, Austin R. Benson, and Anil Damle "Incrementally Updated Spectral Embeddings," *arXiv preprints*, arXiv:1909.01188, 2019

Journal Publications

Heather Wilber, Anil Damle, and Alex Townsend "Data-driven Algorithms for signal processing with rational functions," *SIAM Journal on Scientific Computing*, 44 (3), C185-C209, 2022.

Eric Fuemmeler, Anil Damle, Robert DiStasio "Selected Columns of the Density Matrix in an Atomic Orbital Basis I: An Intrinsic and Non-Iterative Orbital Localization Scheme for the Occupied Space," *Journal of Chemical Theory and Computation* 19 (23), 2023

Vasileios Charisopoulos, Austin R. Benson, and Anil Damle "Communication-efficient distributed eigenspace estimation," *SIAM Journal on Mathematics of Data Science,* 3 (4), 1067-1092, 2021

John Paul Ryan and Anil Damle "Parallel Skeletonization for Integral Equations in Evolving Multiply-Connected Domains,' *SIAM Journal on Scientific Computing,* 43 (3), A2320-A2351, 2021

Anil Damle, and Yuekai Sun "Uniform bounds for invariant subspace perturbations," *SIAM Journal on Matrix Analysis and Applications*, 41 (3), 1208–1236, 2020

Thomas Reeves, Anil Damle, and Austin R. Benson "Network Interpolation," *SIAM Journal on Mathematics of Data Science*, 2 (2), 505–528, 2020

Anil Damle, Antoine Levitt, and Lin Lin "Variational formulation for Wannier functions with entangled band structure," *SIAM Multiscale Modeling and Simulation*, 17 (1), 167-191, 2019

Anil Damle, Victor Minden, and Lexing Ying "Simple, direct and efficient multi-way spectral clustering," *Information and Inference: a Journal of the IMA*, 8 (1), 2019

Anil Damle and Lin Lin "Disentanglement via entanglement: A unified method for Wannier localization," *SIAM Multiscale Modeling and Simulation*, 16 (3), 1392-1410, 2018

Victor Minden, Kenneth L. Ho, Anil Damle, Lexing Ying "A recursive skeletonization factorization based on strong admissibility," *SIAM Multiscale Modeling and Simulation*, 15 (2), 2017

Anil Damle, Lin Lin and Lexing Ying "Computing Localized Representations of the Kohn–Sham Subspace Via Randomization and Refinement," *SIAM Journal on Scientific Computing*, 39 (6), 2017

Victor Minden, Anil Damle, Kenneth Ho and Lexing Ying "Fast spatial Gaussian process maximum likelihood estimation via skeletonization factorizations," *SIAM Multiscale Modeling and Simulation*, 15 (4), 2017

Anil Damle, Lin Lin and Lexing Ying "SCDM-k: Localized orbitals for solids via selected columns of the density matrix," *Journal of Computational Physics*, 334 (1), 2017

Anil Damle and Yuekai Sun "A geometric approach to archetypal analysis and non-negative matrix factorization," *Technometrics*, 59 (3), 2017

Victor Minden, Anil Damle, Kenneth Ho and Lexing Ying "A technique for updating hierarchical skeletonization-based factorizations of integral operators," *SIAM Multiscale Modeling and Simulation*, 14 (1), 2016

Anil Damle, Lin Lin and Lexing Ying "Compressed representation of Kohn-Sham orbitals via selected columns of the density matrix," *Journal of Chemical Theory and Computation*, 11 (4), 2015

Anil Damle, Lin Lin and Lexing Ying, "Pole expansion for solving a type of parametrized linear systems in electronic structure calculations," *SIAM Journal on Scientific Computing*, 36 (6), 2014

Anil Damle, Gregory Beylkin, Terry Haut and Lucas Monzón, "Near optimal rational approximations of large data sets", *Applied and Computational Harmonic Analysis*, 35 (2), 2013

Conferences with Proceedings

Jerry Chee, Megan Renz, Anil Damle, and Chris De Sa "Pruning Neural Networks with Interpolative Decompositions," *Advances in Neural Information Processing Systems*, (35), 2022

Vasileios Charisopoulos and Anil Damle "Communication-efficient distributed eigenspace estimation with arbitrary node failures," *Advances in Neural Information Processing Systems*, (35), 2022

John Paul Ryan, Sebastian Ament, Carla P Gomes, and Anil Damle "The Fast Kernel Transform," *Proceedings of The 25th International Conference on Artificial Intelligence and Statistics*, PMLR 151:11669-11690, 2022.

Vasileios Charisopoulos, Austin R. Benson, and Anil Damle "Entrywise convergence of iterative methods for eigenproblems," *Advances in Neural Information Processing Systems*, (33), 2020

Geoff Pleiss, Martin Jankowiak, David Eriksson, Anil Damle, Jacob R. Gardner "Fast matrix square roots with applications to Gaussian processes and Bayesian optimization," *Advances in Neural Information Processing Systems*, (33), 2020

Matanya B. Horowitz, Anil Damle and Joel W. Burdick, "Linear Hamilton Jacobi Bellman equations in high dimensions," *Proceedings Conference on Decision and Control*, Los Angeles, CA, pp. 5880-5887, Dec. 2014

Anil Damle and Lucy Y. Pao. "Simultaneous numerical optimization for data association and parameter estimation," *Proceedings Joint IEEE Conference on Decision and Control and European Control Conference*, Orlando, FL, pp. 7800-7805, Dec. 2011

Talks

ICIAM 2023, Tokyo (August 2023)

Numerical Analysis in the 21st Century, Oxford (August 2023)

30 years of Acta Numerica, virtual (June 2022)

Householder Symposium XXI, Selva di Fasano (June 2022)

Model Reduction in Quantum Mechanics, UCLA (April 2022)

SIAM Conference on Applied Linear Algebra, Virtual (May 2021)

University of Chicago Applied Math Colloquium, Virtual (October 2020)

Oxford Numerical Analysis Seminar, Virtual (April 2020)

Wannier90 v3.0: new features and applications, Virtual (March 2020)

SCAN Seminar, Cornell University (January 2020)

Joint ATD + AMPS Annual Workshop, Washington (October 2019)

Cornell Center for Applied Math Colloquium, Cornell (September 2019)

International Congress on Industrial and Applied Mathematics, Valencia (July 2019)

International Congress on Industrial and Applied Mathematics, Valencia (July 2019)

Linear Algebra and Optimization Seminar, Stanford (May 2019)

Cornell Center for Applied Math Colloquium, Cornell (September 2018)

SIAM Conference on Mathematical Aspects of Materials Science, Portland (July 2018)

SIAM Conference on Applied Linear Algebra, Hong Kong (May 2018)

Workshop on Mathematical Methods in Quantum Chemistry, Oberwolfach (March 2018)

CSoI seminar, Purdue University (November 2017)

SCAN seminar, Cornell University (September 2017)

CS Brown Bag seminar, Cornell University (August 2017)

SIAM Annual Meeting, Pittsburgh (July 2017)

Householder Symposium XX, Virginia Tech (June 2017)

Applied Mathematics and Analysis Seminar, Duke University (October 2016)

SIAM Annual Meeting, Boston (July 2016)

SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia (May 2016)

Linear Algebra and Optimization Seminar, Stanford (April 2016)

Joint Annual Meeting of GAMM and DMV, Braunschweig (March 2016)

Computer Science Colloquium, Cornell University (February 2016)

SIAM Conference on Applied Linear Algebra, Atlanta (October 2015)

Applied Math Seminar, University of California Berkeley (September 2015)

International Congress on Industrial and Applied Mathematics, Beijing (August 2015)

Applied Math Seminar, Stanford University (April 2015)

Bay Area Scientific Computing Day, Stanford University (December 2014)
Lawrence Berkeley National Lab (April 2014)

Cornell Teaching

CS 4220 / MATH 4260: Numerical Analysis: Linear and Nonlinear Problems (Spring 2024)
CS 6210: Matrix Computations (Fall 2023)
CS 7340: Special Topics in Technology and Society (Fall 2023)
CS 4/5780: Introduction to Machine Learning (Fall 2022)
CS 6210: Matrix Computations (Spring 2022)
CS 4/5780: Introduction to Machine Learning (Fall 2021)
CS 6220: Data-sparse Matrix Computations (Spring 2021)
CS 3220: Computational Mathematics for Computer Science (Fall 2020)
CS 6220: Data-sparse Matrix Computations (Spring 2020)
CS 3220: Computational Mathematics for Computer Science (Fall 2019)
CS 4220 / MATH 4260: Numerical Analysis: Linear and Nonlinear Problems (Spring 2019)
CS 6210: Matrix Computations (Fall 2018)
CS 4220 / MATH 4260: Numerical Analysis: Linear and Nonlinear Problems (Spring 2018)
CS 6220: Data-sparse Matrix Computations (Fall 2017)

Service

Householder Symposium XXII

Chair, local organizing committee — *Summer 2025*

Cornell Computer Science Department — Cornell University

Recruiting committee — *AY 2022-2023*

Cornell Computer Science Department — Cornell University

Graduate Distinction Committee — *Summer 2021 –*

Cornell Center for Applied Mathematics — Cornell University

Colloquium committee — *AY 2021-2022*

Cornell SCAN seminar co-organizer — Cornell University

Co-organizer — *Fall 2018 –*

Cornell Computer Science Department — Cornell University

PhD admissions committee — *AY 2020-2021, 2021-2022, and 2022-2023*

Cornell Computer Science Department — Cornell University

Colloquium committee — *Fall 2018 and Fall 2019*

Cornell Computer Science Department Cornell University

PhD requirements committee *Spring 2018*

Cornell Center for Applied Mathematics Cornell University

PhD admissions committee *AY 2017-2018, 2018-2019, and 2023-2024*

Reviewer

Information and Inference: A Journal of the IMA, ICML, NeurIPS, SIAM Journal on Scientific Computing, Applied and Computational Harmonic Analysis, Communications on Mathematical sciences, Journal of Computational Physics, Journal of Machine Learning Research, SIAM book proposals, Springer book proposals, Cambridge University Press book proposals, Journal of Chemical Theory and Computation, Advances in Computational Mathematics, SIAM Journal on Mathematics of Data Science, Physica Status Solidi B: Basic Solid State Physics, Journal of Computational Chemistry, and Physical Review B.

Minisymposium (co-)organizer

SIAM Conference on Applied Linear Algebra 2018, SIAM Conference on Mathematics of Data Science 2020, SIAM Annual Meeting 2020

Grants

The Scientific Artificial Intelligence (SciAI) Center Co-I

Office of Navel Research 2023-2028

In the amount of $\$11,336,724.00$ *and led by PI Chris Earls with additional Co-Is Nikolaos Bouklas and Alex Townsend*

DMS-EPSRC: The Dynamics and Structure of Multiway Networks PI

National Science Foundation 2021-2024

In the amount of $\$200,000.00$ *and transfered from PI-Benson.*

ATD: Collaborative Research: Statistically Principled Real-Time Detection of Anomalies for Temporal Network Data Co-PI

National Science Foundation 2018-2021

In the amount of $\$124,999.00$ *with co-PI Austin Benson and as part of a collaborative grant with with co-PI Yuekai Sun at the University of Michigan*

NSF Mathematical Sciences Postdoctoral Research Fellowship PI

National Science Foundation 2016-2017

In the amount of $\$150,000.00$.

Awards

Excellence in Teaching and Advising Award 2022

Cornell University, Bowers CIS

James and Mary Tien Excellence in Teaching Award, 2021

Cornell University, College of Engineering

Jack Youden Prize for Best Expository Paper, 2017

Technometrics

Gene Golub Doctoral Dissertation Award, 2016

Stanford University, ICME

Postdoctoral Fellowship in Mathematical Sciences, 2016

National Science Foundation

Gerald J. Lieberman Fellowship, 2015

Stanford University

"The Lieberman Fellowship recognizes doctoral students who have demonstrated broad potential for leadership in academia."

Simons Foundation Math+X Graduate Assistantship, 2014

Stanford University, Math+X

Teaching Assistant Award, 2014

Stanford University, ICME

Student Leadership Award, 2013

Stanford University, ICME

Graduate Research Fellowship, 2011

National Science Foundation