

Paul E. Hand — Curriculum Vitae

Assistant Professor
Mathematics and Computer Science
College of Science and Khoury College of Computer and Information Sciences

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Education

Ph.D. Mathematics, New York University, 5/2009.

Thesis: Homogenization in Cardiac Electrophysiology and Blow-Up in Bacterial Chemotaxis.

Winner of the 2009 Kurt Friedrich's Prize for Outstanding Dissertation in Mathematics.

Advisors: Charles Peskin, Nader Masmoudi.

B.S. Applied and Computational Mathematics, California Institute of Technology, 6/2004.

Positions Held

Assistant Professor, Mathematics and Computer Science, Northeastern University, 8/2018 –

Assistant Professor, Computational and Applied Mathematics, Rice University, 7/2014 – 8/2018

NSF Postdoctoral Fellow, MIT Department of Mathematics, 9/2011 – 5/2014.

Applied Mathematics Instructor, MIT Department of Mathematics, 9/2010 – 7/2013.

Postdoctoral Fellow, New York University School of Medicine, 9/2009 – 8/2010.

Grants and External Support

National Science Foundation (DMS-1464525). Standard grant. Sparse Principal Component Analysis via the Sparsest Element in a Subspace. \$133,789.00. 2014–2018.

National Science Foundation (DMS-1104000). Mathematical Sciences Postdoctoral Research Fellowship (MSPRF). \$135,000.00. 2011–2014

Publications

R. Heckel, P. Hand. Deep Decoder: Concise Image Representations from Untrained Non-convolutional Networks. *International Conference on Learning Representations*, 2019.

P. Hand, O. Leong, V. Voroninski. Phase Retrieval Under a Generative Prior. *Advances in Neural and Information Processing Systems*, 2018. Oral Presentation.

A. Aghasi, A. Ahmed, P. Hand. Blind Deconvolutional Phase Retrieval via Convex Programming. *Advances in Neural and Information Processing Systems*, 2018. Spotlight Presentation.

A. Aghasi, A. Ahmed, P. Hand, B. Joshi. A convex program for bilinear inversion of sparse vectors. *Advances in Neural and Information Processing Systems*, 2018.

- W. Huang, P.A. Absil, K. Gallavan, P. Hand. ROPTLIB: an object-oriented C++ library for optimization on Riemannian manifolds, 2018. To appear in *Transactions on Mathematical Software*.
- W. Huang, P. Hand. Blind Deconvolution by a Steepest Descent Algorithm on a Quotient Manifold. 2017. To appear in *SIAM Journal of Imaging Sciences*.
- P. Hand, V. Voroninski. Global guarantees for enforcing deep generative priors by empirical risk. *Conference on Learning Theory*, 2018. Proceedings of Machine Learning Research, 75, 970-978.
- A. Aghasi, A. Ahmed, P. Hand. BranchHull: convex bilinear recovery from the entrywise product of vectors with known signs. arXiv preprint 1702.04342, 2017.
- P. Hand, B. Joshi. A Convex Program for Mixed Linear Regression with a Recovery Guarantee for Well-Separated Data. *Information and Inference: A Journal of the IMA*, 7(3), 2018, 563-579.
- P. Hand, V. Voroninski. Corruption Robust Phase Retrieval via Linear Programming. arXiv preprint 1612.03547, 2016.
- P. Hand, V. Voroninski. Compressed Sensing from Phaseless Gaussian Measurements via Linear Programming in the Natural Parameter Space. arXiv preprint 1611.05985, 2016.
- P. Hand, V. Voroninski. An Elementary Proof of Convex Phase Retrieval in the Natural Parameter Space via the Linear Program PhaseMax. To appear in *Communications in Mathematical Sciences*, 2016.
- T. Goldstein, P. Hand, C. Lee, S. Soatto, V. Voroninski. Robust, Scalable Structure from Motion with ShapeFit and ShapeKick. In *European Conference on Computer Vision*, 2016, 289-304. Spotlight Presentation.
- P.E. Hand, C. Lee, V. Voroninski. Exact simultaneous recovery of locations and structure from known orientations and corrupted point correspondences. *Discrete and Computational Geometry*, 59(2), 2018, 413-450.
- P.E. Hand, C. Lee, V. Voroninski. ShapeFit: Exact location recovery from corrupted pairwise directions. *Communications on Pure and Applied Mathematics*, 71(1), 2018, 3-50.
- P.E. Hand. PhaseLift is robust to a constant fraction of arbitrary errors. *Applied and Computational Harmonic Analysis*, 42(3), 2017, 550-562.
- L. Demanet and P.E. Hand. Scaling law for finding the sparsest element in a subspace. *Information and Inference*, 3: 295-309, 2014.
- P.E. Hand. Conditions for existence of dual certificates in rank-one semidefinite problems. *Commun. Math. Sci.*, 12(7): 1363-1378, 2014.
- L. Demanet and P.E. Hand. Stable Optimizationless Recovery from Phaseless Linear Measurements. *J. Fourier Anal. Appl.* 20(1): 199-221, 2014.
- P.E. Hand and B.E. Griffith. Empirical study of an adaptive multi scale model for simulating cardiac conduction. *Bulletin of Mathematical Biology* 73(12):3071-3089, 2011.
- P.E. Hand and B.E. Griffith. Adaptive multiscale model for simulating cardiac conduction. *Proc. Natl. Acad. Sci USA* 107:14603-14608, 2010.
- P.E. Hand and C.S. Peskin. Homogenization of an Electrophysiological Model for a Strand of Cardiac Myocytes with Gap Junctional and Electric-Field Coupling. *Bulletin of Mathematical Biology*, 72: 1408-1424, 2010.
- P.E. Hand, B.E. Griffith, and C.S. Peskin. Deriving Macroscopic Myocardial Conductivities by Homogenization of Microscopic Models. *Bulletin of Mathematical Biology*. 71(7): 1707-1726, 2009.
- P.E. Hand. *Homogenization in Cardiac Electrophysiology and Blow-Up in Bacterial Chemotaxis*. Ph.D. thesis, New York University, New York, 2009.

Talks

Theoretical Basis of Machine Learning. International Centre for Information Sciences. Bangalore, India. 29 Dec 2018.

Theoretical Basis of Machine Learning. International Centre for Information Sciences. Bangalore, India. 27 Dec 2018.

Northeastern University. 18 Jan 2018.

Northeastern University. 8 Jan 2018.

Applied Mathematics Special Seminar. CU Boulder. 7 Dec 2017.

Département de mathématiques et applications seminar. École normale supérieure. 24 Nov 2017.

Operations Research Seminar. Rutgers. 10 Oct 2017.

Data Science Seminar. IMA, University of Minnesota. 3 Oct 2017.

Electrical Engineering Seminar. Harvard. 28 Sep 2017.

Algorithms and Complexity Seminar. MIT CSAIL. 27 Sep 2017.

SPIE Optical Engineering + Applications. San Diego. 9 Aug 2017.

Machine Learning Seminar. IBM Watson Research Center. 13 Apr 2017.

Statistical Sciences and Operations Research Seminar. Virginia Commonwealth University. 24 Mar 2017.

Statistics Colloquium. University of Chicago. 1 Feb 2017.

Machine Learning Workshop. Rice. 24 Jan 2017.

Asilomar Conference on Signals, Systems, and Computers. 8 Nov 2016.

Spotlight Session. European Conference on Computer Vision. Amsterdam, Netherlands. 13 Oct 2016.

Ken Kennedy Institute Member Luncheon. Rice University. 7 Oct 2016.

Numerical Analysis Seminar. University of Maryland. Department of Computer Science. 15 Sep 2016.

SIAM Conference on Imaging Sciences. Mini symposium on Convex Signal Recovery from Pairwise Measurements. 24 May 2016.

IDEAS Seminar. Applied Mathematics. Princeton University. 4 May 2016.

Statistics Colloquium. University of Chicago. 25 April, 2016.

Scientific Computing Seminar. Brown University. Jan 28, 2016.

AMS Session on Computer Science, Information, Control Theory, and Economics. Joint Mathematics Meetings. Jan 8, 2016.

Georgia Tech. Stochastics Seminar. Dec 3, 2015.

Oregon State University. Mathematics Colloquium/Applied Mathematics Seminar. Nov 20, 2015.

University of Houston. Scientific Computing Seminar. Nov 5, 2015.

University of Maryland. Norbert Wiener Center Seminar. Oct 13, 2015.

New York University Applied Mathematics Seminar. Oct 9, 2015.

Tufts University Department of Mathematics Colloquium. Sep 25, 2015.

Tufts University Applied/Computational Mathematics Seminar. Sep 23, 2015.

Rice University Department of Mathematics Colloquium. Aug 27, 2015.

Invited Session on High-dimensional Data Analysis. 45th Symposium on the Interface of Computing Science and Statistics. Jul 11, 2015.

General Session on Optimality and Computation. 11th International Conference on Sampling Theory and Applications (SampTA). May 29, 2015.

Mitsubishi Electric Research Laboratories. May 5, 2015.

Texas A&M Numerical Analysis Seminar. Apr 29, 2015.

Rice University Computational and Applied Mathematics Colloquium. Apr 20, 2015.

Special Session on Phase Retrieval, AMS Sectional Meeting. East Lansing, MI. Mar 14, 2015.

University of Indiana - Bloomington Probability Seminar. Mar 12, 2015

University of Wisconsin-Madison Applied and Computational Mathematics Seminar. Mar 7, 2014.

Rice University Special Lecture in Computational and Applied Mathematics. Feb 20, 2014.

Columbia University Applied Mathematics Colloquium. Feb 18, 2014.

University of Wisconsin-Madison Mathematics Colloquium. Dec 6, 2013.

Drexel Mathematics Colloquium. Oct 2, 2013.

Invited Session on Advances in Compressive Sensing. 10th International Conference on Sampling Theory and Applications (SampTA). Jul 4, 2013.

Applied and Computational Mathematics Seminar. Dartmouth College. Nov 20, 2012.

Graduate Student Supervision

Babhru Joshi. Fifth year graduate student, Rice University. Anticipated graduation 5/2019.

Oscar Leong. Third year graduate student, Rice University. Anticipated graduation 5/2021.

Jorio Cocola. Third year graduate student, Northeastern University. Anticipated graduation 5/2021.

Undergraduate Student Supervision

Alex Owens, Rice University. Summer 2016. Anticipated graduation 5/2018.

Honors & Awards

Kurt O. Friedrichs Prize for Outstanding Dissertation In Mathematics, 2009.

NYU Dean's Dissertation Fellowship, 2008-2009.

National Defense Science and Engineering Graduate Fellowship, 2004-2007.

Caltech Upperclass Merit Award, 2002-2004.

Barry M. Goldwater Scholar, 2002.

Teaching

New York University

Quantitative Reasoning. Undergraduate-level course. Fall 2007.

The Cooper Union

Ordinary Differential Equations. Undergraduate-level course. Fall 2005.

Boundary Value Problems. Undergraduate-level course. Spring 2005.

Probability and Statistics. Undergraduate-level course. Fall 2006.

Boundary Value Problems. Undergraduate-level course. Spring 2007.

Ordinary Differential Equations. Undergraduate-level course. Fall 2008.

MIT

Computational Science and Engineering I. Masters-level course. Spring 2012.

Computational Science and Engineering I. Masters-level course. Spring 2013.

Rice University

Analysis I. Graduate-level course. CAAM 501. Fall 2014.

Topics in Optimization - Sparse Structure Recovery. Graduate-level course. CAAM 654. Spring 2015.

Masters Thesis Writing. Graduate-level course. CAAM 600. Cotaught with Jan Hewett and Tim Warburton. Spring 2015.

Analysis I. Graduate-level course. CAAM 501. Fall 2015.

Matrix Analysis. Undergraduate-level course. CAAM 335. Spring 2016.

Masters Thesis Writing. Graduate-level course. CAAM 600. Cotaught with Jan Hewett. Spring 2016.

Analysis I. Graduate-level course. CAAM 501. Fall 2016.

Signal Recovery: Theory and Simulation. Graduate-level course. CAAM 567. Spring 2017.

Analysis I. Graduate-level course. CAAM 501. Fall 2017.

Northeastern University

Probability and Statistics. Undergraduate-level course. MATH 3081. Fall 2018.

Algorithms and Data. Undergraduate-level course. CS 3000. Spring 2019.

PhD/MA Committees Served On

Masters defense (CAAM) external committee member. Oscar Leong. Oct 25, 2018.

Ph.D. Thesis defense (CAAM) committee member. Jian Zhai. Apr 5, 2018.

Masters defense (CAAM) committee member. Temitayo Ajayi. Apr 5, 2018

Ph.D. Thesis proposal (CAAM). Jian Zhai. Mar 27, 2017.

Masters defense (CAAM) committee member. Babhru Joshi. Sep 26, 2016.

Ph.D. Thesis defense (New York University, Mathematics Department). Thang Huynh. External reader. June 29, 2016.

Ph.D. thesis defense (STAT) committee member. Yue Hu. Apr 28, 2016.

Masters thesis defense (Applied Physics) committee member. Jian Chen. Apr 13, 2016.

Masters defense (CAAM) committee member. Boris Brimkov. May 12, 2015.

Thesis proposal (STAT) committee member. Yue Hu. Apr 8, 2015.

Ph.D. defense (CAAM) committee member. Jorge Castanon. Nov 7, 2014.

Rice CAAM Department Service

CAAM Colloquium Chair. 2015–2016.

CAAM Undergraduate Committee. 2015–2016, 2016–2017.

CAAM Graduate Committee. 2014–2015, 2017–2018.

Rice School of Engineering Service

Committee to explore online masters degrees. Committee member. 2017–2018.

Presenter. Data Science meeting at NASA JSC. November 29, 2017.

Engineering Admit Day Panelist. April 24, 2017.

Peer Teaching Evaluator in ENG. Spring 2016. STAT 385, CAAM 210, COMP 130.

Peer Teaching Evaluator in ENG. Fall 2016. STAT 405, CAAM 335.

ELEC 599 committee member. Jeff Lievense. May 1, 2015.

Rice University Service

Center for Written, Oral, and Visual Communication workshop panelist. Apr 6, 2018.

University Library Committee. 2016–2017, 2017–2018.

Security Marshall. Commencement. May 2015.

Participant in faculty working group on Active Learning. Mar 19, 2015.

IBM/Rice Collaboration Workshop participant. Nov 12, 2015.

Director, Tapia STEM Camps. Summer 2018.

Director of Curriculum and Instruction, Tapia Camps in Math, Physics, and Computer Science. Summer 2017.

Lead instructor of STEM Communication at Tapia Math-Science Scholars camp. Summer 2016.

Summer Enhancement Lecturer. Tapia Math Science Scholars Program. Summer 2015.

Mentor. Tapia ELA Faculty Mentoring Program. Fall 2014.

Northeastern University Math Department Service

Hiring committee, 2018–2019.

ZRI Hiring committee, 2018–2019.

Graduate committee, 2018–2019.

Professional Service

Reviewer for Cambridge University Press.

Reviewer for IMA Information and Inference.

Grant Review Panelist. National Science Foundation. Division of Mathematical Sciences.

Reviewer for IEEE Transactions on Signal Processing.

Reviewer for proceedings of Sampling Theory and Applications (SampTA) conference.

Reviewer for Foundations of Computational Mathematics.

Reviewer for SIAM Journal of Imaging Sciences.

Minisymposium organizer for SIAM Conference on Imaging Sciences, 2016.

Other Service

Postdoctoral mentor for K12 videos made by MIT undergraduates, 2012.

Instructor of Multivariable Calculus. MIT. Office of Minority Education Interphase Edge Summer program. Summer 2013.

Instructor of Multivariable Calculus. MIT. Office of Minority Education Interphase Edge Summer program. Summer 2014.

Last updated: January 3, 2019