CURRICULUM VITA

Aditya Viswanathan
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1. Education

Ph.D. – Electrical Engineering **August 2010**
Arizona State University, Tempe, AZ
Co-Advisors: Dr. Anne Gelb (Mathematical and Statistical Sciences) and Dr. Douglas Cochran

M.S. – Electrical Engineering **August 2008**
Arizona State University, Tempe, AZ

B.E. – Electronics and Communication Engineering **June 2005**
R.V. College of Engineering (Visvesvaraya Technological University), Bangalore, India

2. Teaching and Research Interests

Teaching: Linear Algebra, Fourier Analysis, Inverse Problems and Signal Processing, Numerical Analysis

Research: Computational Harmonic Analysis, Scientific Computing, Inverse Problems in Imaging – including Phase Retrieval and Magnetic Resonance Imaging (MRI), Spectral and High-Order Methods for PDEs

3. Employment History

Assistant Professor **September 2017 to present**
Department of Mathematics and Statistics
University of Michigan – Dearborn, Dearborn, Michigan

Visiting Assistant Professor **August 2013 to August 2017**
Department of Mathematics
Michigan State University, East Lansing, Michigan

Postdoctoral Scholar **September 2010 to August 2013**
Applied & Computational Mathematics
California Institute of Technology, Pasadena, California

4. Scientific and Professional Societies Memberships

Society for Industrial and Applied Mathematics (SIAM)
American Mathematical Society (AMS)
Institute of Electrical and Electronics Engineers (IEEE) (and IEEE Signal Processing Society Member)

5. Teaching Activities

a) Chronology of Teaching Assignments at the University of Michigan Dearborn

Term	Course Number	Course Title	Cr. Hrs	Num. of Students
F'20	MATH/ECE 276	Discrete Mathematical Methods in Computer Engineering (2 sections)	4	33, 36
	MATH/CCM 472/572	Introduction to Numerical Analysis	3	18
W'20	MATH/ECE 276	Discrete Mathematical Methods in Computer Engineering (2 sections)	4	33, 33
F'19	MATH/ECE 276	Discrete Mathematical Methods in Computer Engineering	4	33
	MATH/CCM 472/572	Introduction to Numerical Analysis	3	18
S'19	MATH 215	Calculus III (co-taught with Yunus Zeytuncu)	4	23
W'19	MATH 215	Calculus III	4	34
	MATH 523	Linear Algebra with Applications	3	15
F'18	MATH 215	Calculus III	4	33
	MATH 300	Mathematical Language: Proof and Structures	3	15
W'18	MATH 115	Calculus I	4	33
	MATH 116	Calculus II	4	28
	MATH 499	Independent Studies in Math	2	1
F'17	MATH 205	Calculus III for Engineering Students	3	30
	MATH 215	Calculus III	4	26

b) Other Teaching Experiences (at Michigan State University)

Term	Course Number	Course Title	Cr. Hrs	Num. of Students
W' 17	MTH 305	Functions and Calculus for Elementary/Middle School Teachers	3	25
F'16	MTH 314	Matrix Algebra I	3	28
	MTH 299	Transition to Formal Mathematics	4	22
W'15	MTH 299	Transition to Formal Mathematics (2 sections)	4	25, 27
W'14	MTH 124	Survey of Calculus I (2 sections)	3	32, 30

c) Graduate/Undergraduate Student Supervision

Directed and Independent Study

[1] Masters Project in "Utilizing Blurred Measurement Data and Regularization Techniques in Phaseless Imaging," Winter–Summer 2020
Worked with Makwana, K. (ACM Masters student) to study and evaluate the use of regularization techniques in the solution of the phase retrieval problem. In particular, a mathematical framework to solve a discrete, one-dimensional phase retrieval problem in the presence of auxiliary blurred, low resolution with-phase measurements was studied. Through extensive numerical studies, the use of this novel regularization-based framework was shown to improve the efficiency of the reconstruction procedure while simultaneously reducing the number of required measurements.

[2] Masters Project in "Fast Phaseless Signal Recovery with Applications to (Fourier) Ptychographic Imaging," Summer–Fall 2019
Worked with Ebanja, O. (ACM Masters student) to design and develop a novel and efficient method of reconstructing one-dimensional discrete signals from phaseless (magnitude-only) spectrogram (windowed Fourier transform) measurements. Theoretical results were developed using a combination of tools from (discrete) Fourier analysis, linear algebra, and numerical analysis. A corresponding FFT-time reconstruction algorithm was formulated and empirically evaluated through numerical experiments in Matlab.

[3] Independent Study in "Mathematical Optimization," Winter 2018
Worked with Bratto, N. (Mechanical Engineering/Engineering Math major) to study selected topics in optimization including linear programming, duality and optimality conditions, convex optimization, geometric programming, and numerical algorithms for the solution of optimization problems. Mathematical ideas were applied to an industrial project in structural optimization.

Undergraduate Research Projects

[1] Mentor, REU Site in Mathematical Analysis and Applications, 2019 (with Yulia Hristova) and 2020.
Department of Mathematics & Statistics, University of Michigan – Dearborn, Dearborn, MI, USA
Mentored two students each year on a project investigating efficient and robust Fourier–based two-dimensional signal recovery from phaseless (magnitude-only) measurements.

[2] Lead Mentor, Summer Undergraduate Research Institute in Experimental Mathematics (SURIEM), 2016.
Lyman Briggs College, Michigan State University, East Lansing, MI, USA
Mentored a group of four students on a project investigating improved accuracy of Fourier reconstructions (by incorporating edge information) with applications to Magnetic Resonance Imaging (MRI). Results were published as a conference paper at the SPIE Optical Engineering and Applications Conference in August 2017.

[3] Invited Lecturer, Notional Research Experience for Undergraduates Program (NREUP) – part of the MAA *Strengthening Underrepresented Minority Mathematics Achievement* (SUMMA) program, May 2014.
Department of Mathematics, Michigan State University, East Lansing, MI, USA

[4] Mentor, Summer Undergraduate Research Fellowship (SURF), June – August 2012, 2013
Computing & Mathematical Sciences, California Institute of Technology, Pasadena, CA, USA
Mentored a student each summer (Emmanuel Garza-Gonzales and Simon Schulz) on projects developing fast and accurate numerical methods for solving computational electromagnetics problems. Both students went on to pursue graduate programs (at Caltech and Oxford University respectively)

[5] Student Mentor, Computational Science Training for Undergraduates in the Mathematical Sciences (CSUMS), May – July 2009, *School of Mathematical & Statistical Sciences, Arizona State University, Tempe, AZ, USA*

Service on Thesis Committees

[1] External Examiner, Undergraduate Honors Thesis Committee
Barrett – The Honors College, Arizona State University
Thesis Advisor: Anne Gelb, Mathematical & Statistical Sciences, Arizona State University

[i] Alexander Reynolds (April 2016)

[ii] Shane Lubold (October 2015)

[iii] Alexander Gutierrez (August 2012)

6. Research Activities

A. Publications

a) Papers Published or Accepted for Publication in Refereed Journals

[1] Perlmutter, M., Merhi, S., **Viswanathan, A.** and Iwen, M., "Inverting Spectrogram Measurements via Aliased Wigner Distribution Deconvolution and Angular Synchronization," *Information and Inference: A Journal of the IMA,* in press, 2020.

[2] Iwen, M., Preskitt, B., Saab, R. and **Viswanathan, A.**, "Phase Retrieval from Local Measurements: Improved Robustness via Eigenvector-Based Angular Synchronization," *Applied and Computational Harmonic Analysis,* vol 14, no. 1, 2020, pp. 415–444.

[3] Thavappiragasam, M., **Viswanathan, A.** and Christlieb, A., "MOL^{T} based fast high-order three dimensional A-stable scheme for wave propagation," *Journal of Coupled Systems and Multiscale Dynamics,* No. 2–4, pp. 2017, 151–163(13).

[4] Iwen, M., **Viswanathan, A.** and Wang, Y., "Robust Sparse Phase Retrieval Made Easy," *Applied and Computational Harmonic Analysis,* vol. 42, no. 1, 2017, pp. 135–142.

[5] Iwen, M., **Viswanathan, A.** and Wang, Y., "Fast Phase Retrieval from Local Correlation Measurements," *SIAM Journal on Imaging Sciences,* vol. 9, no. 4, 2016, pp. 1655–1688.

[6] **Viswanathan, A.**, Gelb, A. and Cochran, D., "Iterative Design of Concentration Factors for Jump Detection," *Journal of Scientific Computing,* vol. 51, no. 3, 2012, pp. 631–649.

[7] Stefan, W., **Viswanathan, A.**, Gelb, A. and Renaut, R., "Sparsity Enforcing Edge Detection Method for Blurred and Noisy Fourier data," *Journal of Scientific Computing,* vol. 50, no. 3, 2012, pp. 535–556.

[8] **Viswanathan, A.**, Gelb, A., Cochran, D. and Renaut, R., "On Reconstruction from Non-uniform Spectral Data," *Journal of Scientific Computing,* vol. 51, no. 1–3, 2010, pp. 487–513.

c) Conference Proceedings

Refereed by Paper

[1] Cordor*, C., Williams*, B., Hristova, Y. and **Viswanathan, A.**, "Fast 2D Phase Retrieval using Bandlimited Masks," *Proceedings of the 28th European Signal Processing Conference (EUSIPCO),* pp. 980–984, 2020, August, Amsterdam, Netherlands. ***Undergraduate students**

[2] Perlmutter, M., Sissouno, N., Iwen, M. and **Viswanathan, A.**, "A Provably Accurate Algorithm for Recovering Compactly Supported Smooth Functions from Spectrogram Measurements," *Proceedings of the 28th European Signal Processing Conference (EUSIPCO),* pp. 970–974, 2020, August, Amsterdam, Netherlands.

[3] Merhi, S., **Viswanathan, A.** and Iwen, M., "Recovery of Compactly Supported Functions from Spectrogram Measurements via Lifting," *Proceedings of the 12th International Conference on Sampling Theory and Applications (SampTA),* 2017, July, Tallinn, Estonia.

Refereed by Abstract

[4] Iwen, M., Preskitt. B., Saab, R. and **Viswanathan, A.**, "Two Dimensional Phase Retrieval from Local Measurements," *Proceedings of the SPIE Optical Engineering + Applications conference on Wavelets and Sparsity XVII,* 2017, August, San Diego, CA.

[5] Larriva-Latt*, J., Morrison*, A., Radgowski*, A., Tobin*, J., Iwen, M. and **Viswanathan, A.**, "Edge-Augmented Fourier Partial Sums with Applications to Magnetic Resonance Imaging (MRI)," *Proceedings of the SPIE Optical Engineering + Applications conference on Wavelets and Sparsity XVII,* 2017, August, San Diego, CA. ***Undergraduate students**

[6] **Viswanathan, A.** and Iwen, M., "Fast Compressive Phase Retrieval," *Proceedings of the 49th Asilomar Conference on Signals, Systems and Computers,* 2015, November, Pacific Grove, CA.

[7] **Viswanathan, A.** and Iwen, M., "Fast Angular Synchronization for Phase Retrieval via Incomplete Information," *Proceedings of the SPIE Optical Engineering + Applications conference on Wavelets and Sparsity XVI,* 2015, August, San Diego, CA.

[8] **Viswanathan, A.**, Cochran, D., Gelb, A. and Cates, D., "Detection of Signal Discontinuities from Noisy Fourier Data," *Proceedings of the 42th Asilomar Conference on Signals, Systems and Computers,* 2008, October, Pacific Grove, CA.

d) Selected Presentations

[1] **Viswanathan, A.**, Perlmutter, M., Merhi, S. and Iwen, M., "Phase Retrieval from Spectrogram Measurements: Inverting Spectrogram Measurements via Aliased Wigner Distribution Deconvolution and Angular Synchronization," Journal Club Talk, Technical University of Munich, July 2020, (Virtual seminar talk).

[2] **Viswanathan, A.**, Iwen, M., Saab, R., and Wang, Y., "Phaseless Imaging: Fast Algorithms, Recovery Guarantees, and Applications to Bio-Imaging," Computational Modeling and Biomedical Image Processing Symposium, Michigan Technological University, June 2019, Houghton, MI.

[3] **Viswanathan, A.**, Iwen, M., Preskitt, B., and Saab, R., "Reconstructing Signals from Magnitude-Only Measurements," Session on Functional Spaces Suitable for Big Data Analysis, 2nd International Conference on Mathematics of Data Science, Old Dominion University, November 2018, Norfolk, VA.

[4] Iwen, M., Saab, R., Preskitt, B. and **Viswanathan, A.**, "Phase Retrieval from Local Measurements," Applied and Computational Mathematics Seminar, Dept. of Mathematics, Dartmouth College, October 2018, Hanover, NH.

[5] Preskitt, B., Iwen, M., Saab, R. and **Viswanathan, A.**, "Phase Retrieval from Local Measurements: Deterministic Measurement Constructions and Efficient Recovery Algorithms," SIAM Conference on Imaging Science, June 2018, Bologna, Italy.

[6] Preskitt, B., Iwen, M., Saab, R. and **Viswanathan, A.**, "Phase Retrieval from Local Measurements: Deterministic Measurement Constructions and Efficient Recovery Algorithms," SIAM Pacific Northwest Conference, Oregon State University, October 2017, Corvallis, OR.

[7] Preskitt, B., Iwen, M., Saab, R. and **Viswanathan, A.**, "Fast Robust Phase Retrieval from Local Correlation Measurements," AMS Special Session on Mathematics of Signal Processing and Information, Joint Mathematics Meetings (JMM), January 2017, Atlanta, GA.

[8] Iwen, M., **Viswanathan, A.** and Wang, Y., "Fast Robust Phase Retrieval from Local Correlation Measurements," SIAM Conference on Imaging Science, May 2016, Albuquerque, NM.

[9] Iwen, M. and **Viswanathan, A.**, "Fast Angular Synchronization for Phase Retrieval via Incomplete Information," SPIE Optics+Photonics, Wavelets and Sparsity XVI, August 2015, San Diego, CA.

[10] **Viswanathan, A.**, Gelb, A., Cochran, R. and Renaut, R., "Direct Methods for Reconstruction of Functions and their Edges from Non-Uniform Fourier Data," **Invited speaker**, ICERM Research Cluster: Computational Challenges in Sparse and Redundant Representations, The Institute for Computational and Experimental Research in Mathematics, Brown University, November 2014, Providence, RI.

[11] Iwen, M., **Viswanathan, A.** and Wang, Y., "Fast and Robust Phase Retrieval," International Conference on Spectral and High Order Methods (ICOSAHOM 14), June 2014, Salt Lake City, UT.

[12] Gelb, A., Kaber, S. and **Viswanathan, A.**, "Constructing Approximation Kernels for Non-Harmonic Fourier Data," SIAM Annual Meeting, July 2013, San Diego, CA.

[13] **Viswanathan, A.**, Gelb, A., Cochran, R. and Renaut, R., "Incorporating Edge Information in Image Reconstruction," **Invited speaker**, Mathematical Challenges in Biomolecular/Biomedical Imaging and Visualization, Mathematical Biosciences Institute, Ohio State University, February 2013, Columbus, OH.

[14] **Viswanathan, A.**, Gelb, A., Cochran, R. and Renaut, R., "Reconstruction from Non-uniform Spectral Data," SIAM Conference on Imaging Science, April 2010, Chicago, IL.

[15] **Viswanathan, A.**, Gelb, A., Cochran, R. and Renaut, R., "On Reconstruction from Non-uniform Spectral Data," International Conference on Spectral and High Order Methods (ICOSAHOM 09), June 2009, Trondheim, Norway.

B. Research Grants

a) Awarded Research Grants

[1] "Collaborative Research: RUI: Computational Ptychography: Fast Algorithms, Recovery Guarantees, and Applications to Bio-Imaging," $165,904 (University of Michigan – Dearborn share), **Viswanathan, A.**, Hristova, Y. and Zheng, G. (Co-PIs), National Science Foundation (Computational Mathematics program), 2020-2023.

[2] "Mathematics of Phaseless Imaging," Summer Undergraduate Research Experience program (SURE), University of Michigan - Dearborn Campus Grants Program, 2019.

[3] "Focused Research Initiative on Phase Retrieval Algorithms: Computational Efficiency, Deterministic Guarantees, and Auto-Calibration", $20,000, Iwen, M. (PI), Saab, R. and **Viswanathan, A.** (Co-PIs), Institute for Mathematics and its Applications (IMA), University of Minnesota, Minneapolis, August 2017.

7. Service Activities

a) University Service

Campus-wide Committees

Faculty Senate Representative, Graduate Subcommittee (Winter – Summer 2020)
Steering Committee Member, Cybersecurity Center for Education, Research, and Outreach - CCERO (2018 – present)

College Committees

College of Arts, Sciences and Letters (CASL) Academic Standards Committee (Winter – Summer 2020)
College of Arts, Sciences and Letters (CASL) Curriculum Committee (Fall 2019)

Departmental Committees

Faculty Search Committee (2019)
Turfe Lecture Series Committee (2019 to present)

b) Professional Activities

Sessions/Conferences Organized and /or Chaired

[1] Co-Organizer, Mini-Symposium on "Mathematics of Signal Processing, Optimization and Inverse Problems" *SIAM Annual Meeting, Portland, OR, July 9 – 13, 2018*

[2] Session Chair, Special Session on“Sparse Harmonic Transforms and Approximations"
7th International Conference on Computational Harmonic Analysis, Nashville, TN, May 14th–18th 2018

[3] Co-Organizer, Special Workshop on “Phaseless Imaging in Theory and Practice”
Institute for Mathematics and its Applications (IMA), University of Minnesota, Minneapolis, August 14 – 18, 2017

[4] Co-Organizer, AMS Special Session on “Approximation Theory in Signal Processing and Computer Science”
AMS Central Spring Sectional Meeting, Michigan State University, March 14–15, 2015

[5] Session Chair, Special Session on “Approximation Theory in Signal Processing and Computer Science, IV”
AMS Central Spring Sectional Meeting, Michigan State University, East Lansing, MI, 2015

[6] Session Chair, Contributed Talks (Session CT1)
International Conference on Spectral and High Order Methods (ICOSAHOM), Salt Lake City, UT, 2014

c) Technical Reviews

Papers for the Following Journals

Applied and Computational Harmonic Analysis
IEEE Transactions on Information Theory
Journal of Scientific Computing
SIAM Journal of Scientific Computing
Journal of Computational and Applied Mathematics
Numerical Functional Analysis and Optimization
Journal of Fluids Engineering
IEEE Signal Processing Letters
IEEE Transactions on Signal Processing

Papers for the Following Conferences

Sampling Theory and Applications (SampTA)
IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)

d) Other Services

[1] Presenter, Maize and Blue Math Circle, University of Michigan – Dearborn, 2018 – present

[2] Middle School Girls Math & Science Day, Michigan State University, March 2017
Assisted in the organization of a hands-on activity session and presentation on “Group Testing: How to Find What’s Important in Life”.