Anne Gelb

CONTACT INFORMATION

Address:	Department of Mathematics
	Dartmouth College
	27 N. Main Street
	Hanover, NH 03755
Phone:	(603) 646-2951
e-mail:	Anne.E.Gelb@Dartmouth.edu
url:	http://math.darmouth.edu/∼annegelb

EDUCATION

- 1996: Ph.D. Division of Applied Mathematics, Brown University, Providence, RI. (David Gottlieb, Dissertation Advisor.)

- 1991: Sc.M., Division of Applied Mathematics, Brown University, Providence, RI.

- 1989: B.S. Department of Mathematics, UCLA, Los Angeles, CA.

PROFESSIONAL EXPERIENCE

- 2016 – : John G. Kemeny Parents Professor, Department of Mathematics, Dartmouth College.

- 2007-2016: Professor, School of Mathematical & Statistical Sciences, Arizona State University.

- Fall 2012: Visitor, Laboratoire Jacques-Louis Lions Université Pierre & Marie Curie, Paris, France.

- 2007-2009: Associate Chair of Graduate Studies, School of Mathematical & Statistical Sciences, Arizona State University.

- 2001-2007: Associate Professor, Department of Mathematics & Statistics, Arizona State University.

- Fall 2005: Visiting Scientist, Institute of Mathematics and its Applications (IMA), Minneapolis, MN.

- Fall 2004: Visiting Scientist, National Institute of Geophysics and Vulcanology, Bologna, Italy.

- 1998-2001: Assistant Professor, Department of Mathematics & Statistics, Arizona State University.

- 1996-1998: Postdoctoral Fellow, Center for Research in Parallel Computing, California Institute of Technology. (Herbert Keller, Postdoctoral Supervisor.)

REFEREED JOURNAL PAPERS (* indicates undergraduate co-author)

1. T. Scarnati, A. Gelb, and R Platte, *Using ℓ_1 Regularization to Improve Numerical Partial Differential Equation Solvers*, J. Sci. Comput., (2017) first online, 1–28, August 11, 2017.

2. T. Sanders, A. Gelb and R. Platte, *Composite SAR Imaging Using Sequential Joint Sparsity*, Journal of Computational Physics, **338** 357–370 (2017) DOI: 10.1016/j.jcp.2017.02.071.

3. D. Denker and A. Gelb, *Edge Detection of Piecewise Smooth Functions from Under-Sampled Fourier Data Using Variance Signatures*, SIAM Journal on Scientific Computing, **39:2** A559-A592 (2017).

4. T. Sanders, A. Gelb, R. Platte, I. Arslan, and K. Landskron, *Recovering Fine Details from Under-Resolved Electron Tomography Data using Higher Order Total Variation l_1 Regularization* Ultramicroscopy, **174** 97–105 (2017). DOI information: 10.1016/j.ultramic.2016.12.020.

5. A. Gelb and G. Song, *Detecting Edges from Non-uniform Fourier Data Using Fourier Frames*, Journal of Scientific Computing, **71:2** 737–758 (2017) DOI:10.1007/s10915-016-0320-8.

6. G. Song, J. Davis, and A. Gelb, *A High-Dimensional Inverse Frame Operator Approximation Technique*, SIAM J. Numerical Analysis, **54**(4) 2282-2301 (2016), DOI:10.1137/15M1047593.

7. R. Archibald, A. Gelb, and R. Platte, *Image Reconstruction from Undersampled Fourier Data Using the Polynomial Annihilation Transform*, Journal of Scientific Computing, **67** 432–452, (2016), DOI 10.1007/s10915-015-0088-2.

8. G. Wasserman*, R. Archibald and A. Gelb, *Image Reconstruction from Fourier Data Using Sparsity of Edges*, Journal of Scientific Computing, **65:2** 533–552, (2015).

9. R.B. Platte, A. Gutierrez*, and A. Gelb, *Fourier reconstruction of univariate piecewise-smooth functions from non-uniform spectral data with exponential convergence rates*, ACHA, **39:3** 427–449 (2015).

10. A. Gelb and G. Song, *A Frame Theoretic Approach to the Nonuniform Fast Fourier Transform*, SIAM J. Numer. Anal., **52:3** 1222-1242 (2014).

11. A. Martinez*, A. Gelb and A. Gutierrez*, *Edge Detection from Non-Uniform Fourier Data Using the Convolutional Gridding Algorithm*, Journal of Scientific Computing, **61:3** 490-512 (2014).

12. G. Song and A. Gelb, *Approximating the Inverse Frame Operator from Localized Frames*, Applied and Computational Harmonic Analysis, **35:1** 94-110 (2013).

13. A. Gelb and T. Hines, *Recovering Exponential Accuracy from Nonharmonic Fourier Data Through Spectral Reprojection*, Journal of Scientific Computing, **51:1** 158-182 (2012).

14. A. Petersen*, A. Gelb, and R. Eubank, *Hypothesis Testing for Fourier Based Edge Detection Methods*, Journal of Scientific Computing, **51:3** 608-630 (2012).

15. W. Stefan, A. Viswanathan, A. Gelb and R. Renaut, *Sparsity Enforcing Edge Detection Method for Blurred and Noisy Fourier Data*, Journal of Scientific Computing, **50:3** 536-556 (2012).

16. A. Viswanathan, D. Cochran and A. Gelb, *Iterative Design of Concentration Factors for Edge Detection*, Journal of Scientific Computing, **51:3** 631-649 (2012).

17. A. Gelb and T. Hines, *Detection of Edges from Nonuniform Fourier Data*, Journal of Fourier Analysis and Applications, **17:6** 1152-1179 (2011).

18. A. Viswanathan, A. Gelb, D. Cochran and R. Renaut, *On Reconstruction From Non-uniform Spectral Data*, Journal of Scientific Computing, **45:1-3** 487-513 (2010).

19. W. Stefan, R. Renaut and A. Gelb *Improved Total Variation-type Regularization Using Higher-order Edge Detectors*, SIAM Journal on Imaging Sciences, **3:2** 232-251 (2010).

20. R. Archibald, A. Gelb, R. Saxena, and D.B. Xiu *Discontinuity Detection in Multivariate Space for Stochastic Simulations*, Journal of Computational Physics, **228:7** 2676–2689 (2009).

21. R. Platte and A. Gelb, *A Hybrid Fourier-Chebyshev Method for Partial Differential Equations,* Journal of Scientific Computing, **39** 244-264 (2009).

22. A. Gelb and D. Cates, *Segmentation of Images from Fourier Spectral Data*, Communications in Computational Physics, **5**, 326–349 (2009).

23. R. Saxena, A. Gelb, and H. Mittelmann, *A High Order Method for Determining the Edges in the Gradient of a Function*, Communications in Computational Physics, **5**, 694–711 (2009).

24. R. Archibald, A. Gelb, and J. Yoon, *Determining the Locations and Discontinuities in the Derivatives of Functions*, Applied Numerical Mathematics, **58**, 577–592 (2008).

25. A. Gelb, R. Platte, and W. S. Rosenthal*, *The Discrete Orthogonal Polynomial Least Squares Method for Approximation and Solving Partial Differential Equations*, Communications in Computational Physics, **3**, 734–758 (2008).

26. C. Blakely*, A. Gelb, and A. Navarra, *An Automated Method for Recovering Piecewise Smooth Functions on Spheres Free from Gibbs Oscillations*, Sampling Theory in Signal and Image Processing, **6**, 323–346 (2007).

27. D. Cates and A. Gelb, *Determining the Locations of the Discontinuities in the Derivatives of Functions Using Spectral Methods*, Numerical Algorithms, **49**, 59–84 (2007).

28. A. Gelb and D. Cates, *Detection of Edges in Spectral Data III – Improvements in the Presence of Noise*, Journal of Scientific Computing, **36:1** 1–43 (2008).

29. A. Gelb, *Reconstruction of Piecewise Smooth Functions from Non-Uniform Grid Point Data*, Journal of Scientific Computing, **30:3**, 409–440 (2007).

30. A. Gelb and E. Tadmor, *Adaptive Edge Detectors for Piecewise Smooth Data Based on the MinMod Limiter,* Journal of Scientific Computing, **28:2-3**, 279–306 (2006).

31. R. Archibald, A. Gelb, S. Gottlieb and J. Ryan, *One-Sided Post-Processing for the Discontinuous Galerkin Method Using ENO Type Stencil Choosing and the Local Edge Detection Method,* Journal of Scientific Computing, **28:2-3**, 167–190 (2006).

32. A. Gelb and Z. Jackiewicz, *Determining Analyticity for Parameter Optimization of the Gegenbauer Reconstruction Method*, SIAM Journal on Scientific Computing, **27:3**, 1014–1032 (2006).

33. A. Gelb and J. Tanner, *Robust Reprojection Methods for the Resolution of the Gibbs Phenomenon,* Applied Computational and Harmonic Analysis, **20:1**, 3–25 (2006).

34. R. Archibald, A. Gelb, and J. Yoon, *Polynomial Fitting for Edge Detection in Irregularly Sampled Signals and Images*, SIAM Journal on Numerical Analysis, **43**, 259–279 (2005).

35. Y. Ha, C. L. Gardner, A. Gelb, and C.-W. Shu, *Numerical Simulation of High Mach Number Astrophysical Jets with Radiative Cooling,* Journal of Scientific Computing, **24:1**, 29–44 (2005).

36. R. Archibald, J. Hu, A. Gelb, and G. Farin, *Improving the Accuracy of Volumetric Segmentation Using Pre-Processing Boundary Detection and Image Reconstruction,* IEEE Transactions on Image Processing, **13:4**, 459–466 (2004).

37. A. Gelb, *Parameter Optimization and Reduction of Round Off Error for the Gegenbauer Reconstruction Method*, Journal of Scientific Computing, **20:3**, 433–459 (2004).

38. J. P. Gleeson, O. M. Roche, J. West, and A. Gelb, *Modelling Annular Micromixers,* SIAM J. Appl. Math., **64:4**, 1294–1310 (2004).

39. R. Archibald, K. Chen, A. Gelb, and R. Renaut, *Improving Tissue Segmentation of Human Brain MRI Through Pre-Processing by the Gegenbauer Reconstruction Method,* NeuroImage, **20:1**, 489–502 (2003).

40. R. Archibald and A. Gelb, *A Method to Reduce the Gibbs Ringing Artifact in MRI Scans While Keeping Tissue Boundary Integrity,* IEEE Medical Imaging, **21:4**, 305–319 (2002).

41. R. Archibald and A. Gelb, *Reducing the Effects of Noise in Image Reconstruction,* Journal of Scientific Computing, **17:1–4**, 167–180 (2002).

42. C. L. Gardner, A. Gelb, and J. Hernandez, *A Comparison of Modern Hyperbolic Methods for Semiconductor Device Simulation: NTK Central Scheme vs. CLAWPACK,* VLSI Design **15**, 721–728 (2002).

43. A. Gelb, Z. Jackiewicz and B. Welfert, *Absorbing Boundary Conditions of the Second Order for the Pseudospectral Chebyshev Methods for Wave Propagation,* Journal of Scientific Computing, **17:1–4**, 501–512 (2002).

44. A. Gelb and E. Tadmor, *Spectral Reconstruction of Piecewise Smooth Functions from Their Discrete Data*, Mathematical Modelling and Numerical Analysis, **36:2**, 155–175 (2002).

45. A. Gelb, *A Hybrid Approach to Spectral Reconstruction of Piecewise Smooth Functions*, Journal of Scientific Computing, **15**, 293–322 (2001).

46. A. Gelb and J. P. Gleeson, *Spectral Viscosity for Shallow Water Equations in Spherical Geometry*, Monthly Weather Review, **129:9**, 2346–2360 (2001).

47. A. Gelb and E. Tadmor, *Enhanced Spectral Viscosity Approximations for Conservation Laws* Applied Numerical Mathematics **33**, 3–21 (2000).

48. A. Gelb and E. Tadmor, *Detection of Edges in Spectral Data II: Nonlinear Enhancement*, SIAM Journal on Numerical Analysis, **38:4**, 1389–1408 (2000).

49. A. Gelb and E. Tadmor, *Detection of Edges in Spectral Data*, Applied and Computational Harmonic Analysis **7**, 101–135 (1999).

50. A. Gelb, *The Resolution of Gibbs Phenomenon for Spherical Harmonics*, Mathematics of Computation **66:218**, 699–717 (1997).

51. A. Gelb and D. Gottlieb, *The Resolution of Gibbs Phenomenon for "Spliced" Functions in One and Two Dimensions*, Computers & Mathematics with Applications **33:11**, 35–58 (1997).

52. A. Gelb, D. Gottlieb, and N. Paldor, *Wind Set Up Relaxation on a Sloping Beach*, Journal of Computational Physics **138**, 644–664 (1997).

REFEREED CONFERENCE PROCEEDINGS

1. J. McKay, A. Gelb, V. Monga, and R. Raj, *Using Frame Theoretic Convolutional Gridding for Robust Synthetic Aperture Sonar Imaging*, MTS IEEE OCEANS 17 - Anchorage, 2017.

2. D. Denker, R. Archibald and A. Gelb, *An Adaptive Fourier Filter for Relaxing Time Stepping Constraints for Explicit Solvers*, Lecture Notes in Computational Science and Engineering (ICOSAHOM Proceedings), Springer, (2014).

3. A. Viswanathan, D. Cochran, A. Gelb, and D. Cates, *Detection of Signal Discontinuities from Noisy Fourier Data,* Signals, Systems and Computers, Conference Record of the Forty-Second Asilomar Conference, (2008).

4. J. P. Gleeson, O. M. Roche, J. West, and A. Gelb, *Modelling Annular Micromixers*, Technical Proceedings of the 2003 Nanotechnology Conference and Trade Show, **1**, 206–209 (2003).

5. R. Archibald and A. Gelb, *Reducing the Effects of Noise in MRI Reconstruction*, IEEE International Symposium on Biomedical Imaging Conference Proceedings, 497–500 (2002).

6. A. Gelb and R. Archibald, *Reducing the Gibbs Ringing Artifact in MRI Scans While Maintaining Tissue Boundary Integrity*, IEEE International Symposium on Biomedical Imaging Conference Proceedings, 923–926 (2002).

7. A. Gelb and D. Gottlieb, *The Resolution of Gibbs Phenomenon for "Spliced" Functions in One and Two Dimensions*, Proceedings of the Third IMACS International Symposium on Iterative Methods in Scientific Computation, Computation **4**, 275–282 (1997).

BOOK CHAPTERS

1. A. Gelb and S. Gottlieb, *The Resolution of the Gibbs Phenomenon for Fourier Spectral Methods*, **Advances in the Gibbs Phenomenon**, Abdul J. Jerri, Ed. Σ Sampling Publishing, Potsdam, New York, 2011.

CURRENT SUPPORT

- NSF Division of Mathematical Sciences (PI, 25% allocation): "RTG: Data-Oriented Mathematical and Statistical Sciences," 2015-2019, $1,099,995.

- BAA AFOSR (PI, 60% allocation): "Developing Fast, Accurate, and Robust Numerical Algorithms for Extracting Actionable Information from Acquired Sensing Data," 2015-2018, $607,643.

- NSF Division of Mathematical Sciences (PI, 100% allocation): "Collaborative Research: An Integrated Approach to Convex Optimization Algorithms," 2015-2018, $27,735.

PRIOR SUPPORT

- NSF Division of Mathematical Sciences (PI, 50% allocation): "Novel Numerical Approximation Techniques for Non-Standard Sampling Regimes," 2012-2016, $336,853.

- BAA AFOSR (PI, 50% allocation): "Development and Analysis of Non-Classical Numerical Approximation Methods," 2012-2015, $257,056.

- NSF Division of Mathematical Sciences (PI, 24% allocation): "FRG: Mathematical Foundations of Magnetic Resonance Imaging," 2007-2012, $818,374.

- NSF Division of Mathematical Sciences (senior personnel, 10% allocation): "CSUMS: Undergraduate Research Experiences for Computational Math Science Majors at ASU," 2007-2012, $609,671.

- NSF Division of Mathematical Sciences (PI, 100% allocation): "Southwest Conference on Integrated Mathematical Methods in Medical Imaging," 2009-2010, $30,520.

- NSF Division of Mathematical and Physical Sciences (co-PI, 100% allocation): "RUI: Adaptive High-Order Methods for Solving PDEs," 2006-2009, ASU sub-award amount $37,000.

- NSF Division of Mathematical and Physical Sciences (PI, 25% allocation): "High Order Reconstruction Using Spectral Methods," 2005–2008, $226,547.

- NSF Division of Mathematical and Physical Sciences REU Supplement (PI, 100%): "High Order Reconstruction Using Spectral Methods," 2005–2008, $10,000.

- NSF Division of Shared Cyberinfrastructure (PI, 60%): "Collaborative Research ITR: An Integrated Simulation Environment for High Resolution Computational Methods in Electromagnetics with Biomedical Applications," 2004–2007, ASU award amount $280,000.

- NIH National Institute of Biomedical Imaging and Bioengineering (co-PI, 30%): "Improvements in MR and Dynamic PET Imaging Algorithms," 2003–2006, $510,875.

- NSF Division of Mathematical Sciences Infrastructure Program (co-PI, 15%): "Scientific Computing Research in Mathematical Sciences," 2004–2007, $80,298.

- NSF Division of Earth Sciences, Geophysics Program (co-PI, 33%): "Experiments Aimed at Improving Global Seismic Tomography," 2002–2005, $180,500.

- NSF Computational Mathematics (PI, 100%): "High Resolution Finite Difference Methods and Spectral Algorithms for Piecewise Smooth Data," 2001–2004, ASU sub-award $16,504.

PRESENTATIONS AT CONFERENCES, SYMPOSIA, AND WORKSHOPS

1. "High order l_1 regularization techniques for reconstructing images from Fourier Data", AFOSR EM Program Review Meeting, Arlington, VA, January, 2017.

2. "Developing Fast, Accurate, and Robust Numerical Algorithms for Extracting Actionable Information from Acquired Sensing Data," AFOSR EM/SSN Program Review Meeting, Arlington, VA, January, 2016.

3. "Frame Theoretic Convolutional Gridding (NFFT)," SIAM Conference on Computational Science & Engineering, Salt Lake City, Utah, March, 2015.

4. "Incorporating the Sparsity of Edges into Image Reconstruction from Fourier Data," AFOSR Computational Mathematics Annual Meeting, July, 2014.

5. "Numerical Approximation Methods for Non-Uniform Fourier Data," International Conference on Spectral and Higher Order Methods (ICOSAHOM), Salt Lake City, Utah, June, 2014.

6. "Numerical Approximation Methods for Non-Uniform Fourier Data," SIAM Annual Meeting, mini-symposium, San Diego, CA, July 2013.

7. "Numerical Approximation Methods for Non-Uniform Fourier Data," Mathematical Challenges in Biomolecular and Biomedical Imaging and Visualization, Mathematical Biosciences Institute, Ohio State University, February, 2013.

8. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," 2nd Midwest Conference on Mathematical Methods for Images and Surfaces, Lansing, MI, invited speaker, August 2011.

9. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," February Fourier Talks, The Norbert Weiner Center for Harmonic Analysis and Applications, invited speaker, February 2011.

10. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," International Conference on Advances in Scientific Computing, invited speaker, Brown University, December 2009.

11. "High Order Methods for Image Analysis," International Conference on Spectral and Higher Order Methods (ICOSAHOM), mini-symposium organizer, Trondheim, Norway, June 2009.

12. "Edge Detection from Fourier Data," Midwest Conference on Mathematical Methods for Biomedical Images and Biological Surfaces, invited speaker, Lansing, Michigan, April 2009.

13. "Reconstructing Piecewise Smooth Images from Fourier Spectral Data," International Conference on Spectral and Higher Order Methods (ICOSAHOM), Keynote speaker, Beijing, China, June 2007.

14. "Reconstructing Piecewise Smooth Images from Fourier Spectral Data," Higher Order and Spectral Methods Workshop, Xiamen, China, June 2007.

15. "Spectral Viscosity Approximations for the Shallow Water Equations on a Sphere," SIAM Mathematics and Geophysics Conference, Avignon, France, June 2005.

16. "Multivariate Local Edge Detection on Scattered Data," 6th International Conference on Spectral and High-Order Methods, Providence, RI, June 2004.

17. "Multivariate Local Edge Detection on Scattered Data," SIAM Conference on Imaging Science, Salt Lake City, UT, May 2004.

18. "Simulation of a 2D MESFET Using the Tadmor Central Scheme," SIAM Conference on Computational Science and Engineering, San Diego, CA, February 2003.

19. "Reducing the Effects of Noise in Image Reconstruction," IEEE Biomedical Imaging Conference, Washington, DC, July 2002.

20. "High Resolution Image Reconstruction in the Presence of Noise," Intermountain/Southwest Conference on Interdisciplinary and Industrial Mathematics, Logan, UT, March 2002.

21. "Hyperbolic Central Schemes for Electrogasdynamics," SIAM Annual Meeting, mini-symposium co-organizer, San Diego, CA, July 2001.

22. "A Hybrid Approach to Spectral Reconstruction of Piecewise Smooth Functions," 5th International Conference on Spectral and High-Order Methods, Uppsala, Sweden, June 2001.

23. "Edge Detection and Applications to Computer Tomography Problems," SIAM Annual Meeting, mini-symposium organizer, Rio Grande, Puerto Rico, July 2000.

24. "The Enhanced Spectral Viscosity Method for Numerical Models," 4th International Conference on Spectral and High-Order Methods, Tel Aviv, Israel, July 1999.

INVITED COLLOQUIA AND SEMINAR TALKS

1. "High Order ℓ_1 Regularization Techniques for Reconstructing Images from Fourier Data," Applied Mathematics Seminar, Brown University, October 2017

2. "High Order ℓ_1 Regularization Techniques for Reconstructing Images from Fourier Data," International Conference on Scientific Computing and Differential Equations (SciCADE), Invited speaker, Bath, England, September 2017.

3. "Image Reconstruction and Data Extraction from Indirect Data", Wright-Patterson Air Force Base Summer Internship Program (SOCHE Intern), June 2017.

4. "High order l_1 regularization techniques for reconstructing images from Fourier Data", Department of Mathematics and Statistics Colloquium, University of Missouri, Kansas City, October 2016.

5. "High order l_1 regularization techniques for reconstructing images from Fourier Data", Department of Mathematics, Dartmouth College Applied and Computational Mathematics Seminar, September 2016.

6. "Mathematics in Imaging: From Medical Diagnosis to Synthetic Aperture Radar", 25th Annual Karen E. Wetterhahn Symposium Keynote Address: May 26, 2016, Dartmouth College.

7. "High Order Function Reconstruction from Non-Uniform Fourier Data Using Fourier Frames," Department of Mathematics Colloquium, Dartmouth College, February 2015.

8. "High Order Function Reconstruction from Non-Uniform Fourier Data Using Fourier Frames," Computational Analysis Seminar, Vanderbilt University, April, 2014.

9. "Numerical Approximation Methods for Non-Uniform Fourier Data," Air Force Research Laboratory, Wright Patterson AFB, OH, January, 2014.

10. "Numerical Approximation Methods for Non-Uniform Fourier Data," University of Arizona Applied Mathematics Colloquium, November, 2013.

11. "Numerical Approximation Methods for Non-Uniform Fourier Data," Center for Scientific Computation and Mathematical Modeling, University of Maryland, February, 2013.

12. "Numerical Approximation Methods for Non-Uniform Fourier Data," LMAC, Université de Technologie de Compiègne, France, December 2012.

13. "Numerical Approximation Methods for Non-Uniform Fourier Data," Laboratoire Jacques-Louis Lions Université Pierre & Marie Curie, Paris, France, November 2012.

14. "Numerical Approximation Methods for Non-Uniform Fourier Data," Department of Mathematics Seminar, Politecnico di Torino, Italy, October 2012.

15. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," Department of Mathematics and Statistics, University of Limerick, August 2012.

16. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," Department of Mathematics Colloquium Speaker, Spelman College, March 2012.

17. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," Department of Mathematics Colloquium Speaker, Case Western Reserve, October 2011.

18. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," Honors Week Speaker, Department of Mathematics, Northern Arizona University, April, 2011.

19. "Applications for High Order Numerical Methods," Honors Week Speaker, Department of Mathematics, Northern Arizona University, April, 2011.

20. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," Seminar Speaker, Department of Mathematics, University of Wisconsin, April 2011.

21. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," Colloquium Speaker, Department of Mathematics, University of Wyoming, April 2010.

22. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," Colloquium Speaker, Department of Mathematics and Computer Science, Colorado School of Mines, April 2010.

23. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," Colloquium Speaker, Department of Mathematics, Michigan State University, March 2010.

24. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," Colloquium Speaker, Department of Mathematics, University of Alabama, March 2010.

25. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," Seminar Speaker, Department of Biomedical Engineering, University of Arizona, February 2010.

26. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," Colloquium Speaker, Department of Mathematics, University of Arizona, February 2010.

27. "Reconstruction of Piecewise Smooth Functions from Non-Uniform Fourier Coefficients," Colloquium Speaker, Applied Mathematics, California Institute of Technology, January 2010.

28. "Challenges in MR Imaging," Mathematics, Computers, and Information Research, Office of Naval Research, August 2009.

29. "Applications for High Order Numerical Methods," Mathematics, Computers, and Information Research, Office of Naval Research, July 2009.

30. "Numerical Methods for Image Reconstruction," Summer REU Program, University of Wyoming, July 2009.

31. "High Order Image Reconstruction from Fourier Data," Applied Math Seminar, Michigan State University, March, 2008.

32. "High Order Image Reconstruction from Fourier Data," Applied and Computational Mathematics Seminar, University of North Carolina, Charlotte, February, 2008.

33. "Reconstructing Piecewise Images from Fourier Spectral Data," University of Utah Center for Scientific Computing, September, 2007.

34. "Reconstructing Piecewise Images from Fourier Spectral Data," MTBI Summer Program, Arizona State University, June, 2007.

35. "Image Reconstruction from Fourier Data," Department of Mathematics REU Summer Program, Northern Arizona University, July 2006.

36. "Recent Advances in Reconstruction Methods for Piecewise Smooth Functions," Department of Mathematics Colloquium, University of Wyoming, April 2006.

37. "Recent Advances in Reconstruction Methods for Piecewise Smooth Functions," Department of Computational and Applied Mathematics Colloquium, Rice University, January 2006.

38. "Region Extraction Using Edge Detection and B-Splines," Institute of Mathematics and its Applications (IMA), Minneapolis, MN, December 2005.

39. "High Order Reconstruction Methods for Piecewise Smooth Functions," Institute of Mathematics and its Applications (IMA), Minneapolis, MN, October 2005.

40. "Recent Advances in Reconstruction Methods for Piecewise Smooth Functions," Computational Mathematics Seminar, Brown University, October 2005.

41. "Reconstruction of Piecewise Smooth Functions," Applied Mathematics Seminar, Uppsala University, Sweden, May 2005.

42. "Reconstruction of Piecewise Smooth Functions," Applied Mathematics Seminar, University of Delaware, April 2005.

43. "Reconstruction of Piecewise Smooth Functions," Department of Mathematics Colloquium, Rensselaer Polytechnic Institute, March 2005.

44. "Reconstruction of Piecewise Smooth Functions," Computational Mathematics Seminar, Purdue University, March 2005.

45. "Reconstruction of Piecewise Smooth Functions," Department of Mathematics Colloquium, Colorado State University, February 2005.

46. "Multivariate Edge Detection," Department of Mathematics Colloquium, University of Arizona, February 2005.

47. "Spectral Methods for Piecewise Smooth Functions," Computational Science and Engineering Seminar, University of Arizona, February 2005.

48. "Spectral Methods for Piecewise Smooth Functions," Department of Mathematics Seminar, Politecnico di Milano, Italy, December 2004.

49. "Spectral Methods for Piecewise Smooth Functions," Department of Mathematics Seminar, Politecnico di Torino, Italy, December 2004.

50. "Spectral Methods for Piecewise Smooth Functions," National Institute of Geophysics and Vulcanology, Bologna, Italy, December 2004.

51. "Spectral Methods for Piecewise Smooth Functions," Department of Mathematics Seminar, University of Modena, Italy, December 2004.

52. "Spectral Methods for Piecewise Smooth Functions," Department of Modelling and Scientific Computing, Ecole Polytechnique Fédérale de Lausanne, Switzerland, November 2004.

53. "Higher Order Finite Difference Methods for Advection Diffusion Problems," National Institute of Geophysics and Vulcanology, Bologna, Italy, October 2004.

54. "Spectral Viscosity for Shallow Water Equations on a Sphere," National Institute of Geophysics and Vulcanology, Bologna, Italy, October 2004.

55. "High Order Reconstruction Algorithms for Medical Imaging," Barrett Medical Research Lab, University of Arizona, April 2004.

56. "Multivariate Local Edge Detection Method on Scattered Data," Department of Mathematics Colloquium, University of New Mexico, November 2003.

57. "Research Opportunities for Undergraduates in Image Reconstruction," Department of Mathematics REU Summer Program, Northern Arizona University, June 2003.

58. "Spectral Methods for Piecewise Smooth Functions," Applied Mathematics Seminar, Duke University, March 2003.

59. "Spectral Methods for Piecewise Smooth Functions," Center for Scientific Computation and Mathematical Modeling Seminar, University of Maryland, March 2003.

60. "The Resolution of the Gibbs Phenomenon for Discontinuous Problems," Department of Mathematics Colloquium, Cork University, Ireland, February 2003.

61. "Applications of Spectral Methods," Applied Mathematics Seminar, Colorado State University, September 2002.

62. "Spectral Methods for Discontinuous Problems," Lawrence Livermore National Laboratory, April 2002.

63. "Reducing the Effects of Noise in Image Reconstruction," Department of Mathematics Colloquium, University of Wyoming, September 2001.

64. "Reducing the Effects of Noise in Image Reconstruction," Computational Mathematics Seminar, Brown University, September 2001.

65. "A Hybrid Approach to Spectral Reconstruction of Piecewise Smooth Functions," Applied Mathematics Seminar, Stanford University, November 2000.

66. "Enhanced Spectral Viscosity Approximations for Conservation Laws," Applied Mathematics Seminar, Georgia Institute of Technology, April 2000.

67. "Edge Detection and Reconstruction of Piecewise Smooth Functions from Their Spectral Data," IEEE Communications and Signal Processing, Phoenix Chapter, March 2000.

68. "Enhanced Spectral Viscosity Approximations for Conservation Laws," Numerical Analysis Seminar, Texas A&M University, March 2000.

69. "Edge Detection and Reconstruction of Piecewise Smooth Functions on Spheres," National Center for Atmospheric Research, August 1999.

70. "Advances in the Edge Detection Method," Computational Mathematics Seminar, Brown University, March 1999.

71. "Advances in the Edge Detection Method," Department of Scientific Computing Colloquium, Uppsala University, Sweden, March 1999.

72. "The Enhanced Spectral Viscosity Method for Partial Differential Equations," IMGA-CNR Seminar, Bologna, Italy, June 1998.

73. "The Resolution of the Gibbs Phenomenon for Spherical Harmonics," IMGA-CNR Seminar, Bologna, Italy, May 1997.

COURSES TAUGHT

- ASU: Graduate courses in computational methods, finite difference methods for hyperbolic partial differential equations, spectral methods for partial differential equations, and computational methods for problems in biology and epidemiology. Upper division courses in numerical analysis and scientific computing, and lower division courses in calculus I, II, III, business calculus, differential equations, and linear algebra.

- Dartmouth College: Graduate courses in fundamental numerical analysis and numerical methods for hyperbolic partial differential equations. Undergraduate courses in differential equations (math 23) and data driven modeling (math 76).

ADDITIONAL RELATED TEACHING ACTIVITIES

- Undergraduate Research Experience: (ASU) I mentored more than fifteen students in the NSF funded Computational Science Training for Undergraduates in the Mathematical Sciences (CSUMS) and Mentoring Through Critical Transitions (MCTP) programs (2010-2016). I have also mentored about ten undergraduates either through various NSF-REU awards (2010-2016) or for their undergraduate honors theses. Six of my publications are co-written with authors who were undergraduate students at the time of the research.

- ASU Summer Learning Institute (Summer 2011, Summer 2012): With funds from the NSF-FRG award, I organized and directed a six week program that brought undergraduate and graduate students together with faculty to study mathematical methods in medical imaging. The faculty mentored individual undergraduate research projects. More information can be found at http://math.asu.edu/ asufrg/sli11/people.php.

- (ASU) Preparing Future Math Faculty Advisor, 2001–2003, 2006–2007, 2009, 2010

- Undergraduate Research Experience: (Dartmouth) (i) I co-developed and co-directed a summer research experience for undergraduates (REU) in the Department of Mathematics (2017), funded in part by the NSF and in part by Dartmouth College. More information can be found at https://math.dartmouth.edu/ reu/. (ii) Supervised a project supported by the Kaminsky Undergraduate Research Award (Summer 2017).

STUDENT AND POST-DOCTORAL SUPERVISION

- Doctoral Dissertation Advisor for Dennis Denker, *High Order Sparsity Exploiting Methods with Applications in Imaging and PDEs*, Ph.D 2016, School of Mathematical and Statistical Sciences, Arizona State University.

- Doctoral Dissertation Co-Advisor for Utku Ilkturk, *Observability Methods in Sensor Scheduling*, Ph.D July 2015, School of Mathematical and Statistical Sciences, Arizona State University.

- Doctoral Dissertation Co-Advisor for Adityavikram Viswanathan, *Imaging from Fourier Spectral Data: Problems in Non-harmonic Fourier Reconstruction, Discontinuity Detection, and Point-Spread Function Estimation*, Ph.D 2010, Electrical Engineering, ASU.

- Doctoral Dissertation Co-Advisor for Rishu Saxena, *High Order Methods for Edge Detection and Applications*, Ph.D. 2008.

- Doctoral Dissertation Advisor for Dennis Cates, *Edge Detection Using Fourier Data With Applications*, Ph.D. 2007.

- Doctoral Dissertation Advisor for Rochus Boerner, *Construction of MRAs and Wavelets with Arbitrary Integer Dilation Factor $a = 2, 3 \cdots$.*, Ph.D. 2004.

- Doctoral Dissertation Advisor for Richard Archibald, *Boundary Detection and Reconstruction in Magnetic Resonance Imaging*, Ph. D. 2002.

- Masters Thesis Co-Advisor for Adityavikram Viswanathan, *Spectral sampling and discontinuity detection methods with application to magnetic resonance imaging*, MS. 2008, Electrical Engineering, ASU.

- Undergraduate Honors Thesis Advisor for Alexander Reynolds, *Edge Detection from Spectral Phase Data*, May, 2016.

- Undergraduate Honors Thesis Advisor for Jingjing Fan, *An l_1 Regularization Algorithm for Reconstructing Piecewise Smooth Functions from Fourier Data Using Wavelet Projection*, November, 2015.

- Undergraduate Honors Thesis Advisor for Ryan Mead, *An l_1 Regularization Algorithm for Reconstructing Piecewise Smooth Functions from Fourier Data Using Wavelet Projection*, November, 2015.

- Undergraduate Honors Thesis Advisor for Shane Lubold, *A Statistical Framework for Detecting Edges from Noisy Fourier Data Using Multiple Concentration Factors*, October, 2015.

- Undergraduate Honors Thesis Advisor for Rachael Moore, *Designing Concentration Factors to Detect Jump Discontinuities from Non-uniform Fourier Data*, ASU B.S. August, 2015.

- Undergraduate Honors Thesis Advisor for Adam Martinez, *Edge Detection from Non-Uniform Fourier Data via a Modified Method of Convolutional Gridding*, B.S. 2013.

- Undergraduate Honors Thesis Advisor for William Steven Rosenthal, *Discrete Orthogonal Polynomial Least Squares Approximation for Image Reconstruction and Solving Partial Differential Equations*, B.S. 2007.

- Undergraduate Honors Thesis Advisor for Miguel Sanchez, *A Study on the Accuracy and Competitiveness of the Mapped Chebyshev Method*, B.S. 2007.

- Post-Doctoral Supervisor for Dr. Donghwan Kim, 2017–.

- Post-Doctoral Supervisor for Dr. Toby Sanders, 2015–2016.

- Post-Doctoral Supervisor for Dr. Jacqueline Davis, 2015–2016.

- Post-Doctoral Supervisor for Dr. Rodrigo Platte, 2006.

- Post-Doctoral Supervisor for Dr. James Gleeson, 1999–2000.

PROFESSIONAL SERVICE

- Dartmouth College Department of Mathematics: Chair of Search Committee (2017–2018).

- Dartmouth College Thayer School: Search Committee (2017–2018).

- Dartmouth College Physics Review Committee (2018).

- Dartmouth College Senior Fellowship Committee (2017–).

- Dartmouth College Department of Mathematics: Graduate Admissions Committee (2016–).

- School of Mathematical and Statistical Sciences, Arizona State University: Personnel and Budget Committee: 2002–2004, 2009–2010, 2011–2012, 2014–2016, (Chair: 2015-2016). Review Committee: 2007–2009, 2013-2014. Tenure Track and Visitor Search Committees: 2001, 2002, 2005, 2007, 2008, 2009, 2013. Graduate Committee:2001–2004, 2013–2014. Chair of Director Search Committee, SoMSS: 2011–2012. Director of Graduate Studies: 2007–2009. Colloquium Committee: 1998–2000, 2006–2007. Affirmative Action Training: 2003. Program Review Committee: 2000–2001.

- College of Liberal Arts and Science (CLAS) Arizona State University Service: Dean's Advisory Committee: 2014–2016. Faculty Senate: 2005–2007. Academic Standards Committee: 1999–2001.

- Academic Community Service: Member of SIAM Committee on Science Policy: 2014-2016, 2016–. SIAM representative for the Joint Committee on Women in the Mathematical Sciences, 2 year term, 2013-2015.

- Conferences and Workshops Organized:
  - Organizing Committee (lead), Research Cluster: Computational Challenges in Sparse and Redundant Representations, Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University, Nov 3-21, 2014.
  - Local Organizing Committee, International Conference on Spectral and Higher Order Methods, University of Utah, June 2014.
  - Lead Organizer, American Institute of Mathematics, Structured Quartet Research Ensembles (AIM-SQuaREs): Understanding the Mathematical Underpinnings in Medical Imaging, 2013-2016.
  - Organizing Committee, Mathematical Challenges in Biomolecular and Biomedical Imaging and Visualization, Mathematical Biosciences Institute, Ohio State University, February 18-22, 2013.
  - Organizing Committee, Southwest Conference on Integrated Mathematical Methods in Medical Imaging, http://math.asu.edu/ scimm/, Arizona State University, February 6-7, 2010.
  - Organizing Committee, Southwest Conference on Integrated Mathematical Methods in Medical Imaging, http://math.asu.edu/ scimm/, Arizona State University, February 6-7, 2010.

- Organizing Committee, An International Conference on the Research Trends in PDE, Modeling, and Computation: in honor of Professor David Gottlieb's 60th birthday, Brown University, Nov 7-8, 2004.

- Editorial Boards: SIAM Journal on Scientific Computing (2014 –), Journal of Scientific Computing (2006–), and Applied Numerical Mathematics (2006–2014).

- Peer Review of Articles: Advances in Computational Mathematics, Applied Numerical Mathematics, Communications in Computational Physics, Electronic Letters on Computer Vision and Image Analysis, IMA Journal of Numerical Analysis, International Conference of Numerical Analysis and Applied Mathematics, International Journal for Numerical Methods in Fluids, Journal of Approximation Theory, Journal of Computational and Applied Mathematics, Journal of Computational Physics, Journal of Fourier Analysis and Applications, Journal of Engineering Science and Technology, Journal of Scientific Computing, Mathematical Biosciences and Engineering, Mathematics of Computation, Pattern Recognition Letters, Scholarpedia, Sampling Theory in Signal and Image Processing, SIAM Journal on Numerical Analysis, and SIAM Journal on Scientific Computing.

- Research Proposals and Site Reviews: National Science Foundation, American Institute of Mathematics, Swedish Research Council, and U.S.-Israel Bi-national Science Foundation.

HONORS AND AWARDS

- Alfred P. Sloan Research Fellowship, $35,000, 1999.

- Nominated for the College of Liberal Arts and Sciences Distinguished Teaching Award, Arizona State University, 1999.

- Nominated for the Outstanding Mentor Award for the Graduate Women's Association, Arizona State University, 2002, 2011.

- Fondation Sciences Mathématiques de Paris Fellowship, 2012.

OURTREACH ACTIVITIES

- Judge for essay contest sponsored by the Association for Women in Mathematics for biographies of contemporary mathematicians and statistics in academic, industrial and government careers written students in grades 6-12 and college undergraduates (2017).