Adrianna Gillman

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Education

Ph.D., Applied Mathematics, University of Colorado at Boulder (CUB), August 2011

- *Advisor:* Per-Gunnar Martinsson

M.S., Applied Mathematics, California State University, Northridge (CSUN), June 2006

- *Advisor:* Rabia Djellouli

B.S., Applied Mathematics, CSUN, May 2003

Junior level undergraduate student, *Uppsala Universitet* SWEDEN, 2001-2002.

Professional Experience

John Wesley Young Research Instructor in Mathematics, Dartmouth College, July 2011 - Present.

Intern, Summer Internships in Parallel Computational Science (SIParCS) program at National Center for Atmospheric Research (NCAR), June-August 2008.

Visiting Graduate Research Assistant, Laboratoire de Mathématiques Appliquées-UPPA Université de Pau FRANCE, January and December 2005.

Research Interest

- Numerical methods for linear PDEs.
- Numerical linear algebra.
- "Fast" algorithms such as the Fast Multipole Method and methods for $\mathcal{H}$-matrices.
- Integral equation formulations for the mathematical modeling of physics and other real world applications.

Publications

A. Gillman, P. Young, and P.G. Martinsson. "A direct solver with $O(N)$ complexity for integral equations on one-dimensional domains," *Frontiers of Mathematics in China*, 7 (2012), no. 2, pp. 217-247.

A. Gillman, P. Young, and P.G. Martinsson. "Numerical homogenization via approximation of the solution operator," In B. Engquist, O. Runborg, R. Tsai, editors, *Numerical Analysis of Multiscale Computations*, volume 82 of Lecture Notes in Computational Science and Engineering, Heidelberg, 2011. Springer Verlag. pp. 187 - 216.

A. Gillman and P.G. Martinsson. "Fast and accurate numerical methods for solving elliptic difference equations defined on lattices," *Journal of Computational Physics*, 229(2010), pp. 9026-9041.

A. Gillman, R. Djellouli, and M. Amara. "A Mixed Hybrid Formulation Based on Oscillated Polynomials for Solving Helmholtz Problems," *Journal of Computational and Applied Mathematics*, 204(2007), pp.515-525.

Papers submitted or in preparation

A. Gillman and P.G. Martinsson, "A linear scaling fast direct solver for a new composite spectral scheme ," In preparation.

A. Gillman and P.G. Martinsson, "A simplified technique for the efficient and high-order accurate discretization of boundary integral equations in 2D on domains with corners," In preparation.

A. Gillman and A. Barnett, "A fast direct solver for quasi-periodic scattering problems," Submitted to JCP.

A. Gillman and P.G. Martinsson. "An $O(N)$ algorithm for constructing the solution operator to elliptic boundary value problems in the absence of body loads," Under revision.

A. Gillman, and P.G. Martinsson. "A fast solver for Poisson problems on infinite regular lattices," Submitted. (`arXiv:1105.3505 [math.NA]`)

Thesis

A. Gillman, Fast direct solvers for elliptic partial differential equations, PhD Thesis, CUB, 2011.

A. Gillman, On the numerical performance of a mixed-hybrid type solution methodology for solving high-frequency Helmholtz problems, Masters Thesis, CSUN, 2006.

Academic Experiences and awards

- SIAM Travel Award to attend the SIAM Conference on the Computational Science and Engineering (CSE13), February 2013.
- AWM-NSF Travel Grant to attend SIAM Conference on Applied Linear Algebra, June 2012.
- SIAM Student Travel Award to attend the 7th International Congress on Industrial and Applied Mathematics (ICIAM 2011), July 2011.
- IMA Hot Topics Workshops: Integral Equation Methods, Fast Algorithms and Applications, August 2010.
- SIAM Student Travel Award to attend SIAM Conference on Applied Linear Algebra (LA09), October 2009.
- Recipient of the Donald Bianchi Outstanding Graduate Student Research Award, 2006.

Invited Presentations

- "A fast direct solver for quasi-periodic scattering problems," CSE13, February 2013.
- "Fast direct solution techniques for elliptic partial differential equations," Tufts University Mathematics Colloquium, December 2012.
- "A composite spectral method for variable coefficient elliptic PDEs with its own fast direct solver," Numerical Analysis and Scientific Computing Seminar at Courant Institute of Mathematical Sciences, November 2012.
- "Fast direct solvers for elliptic partial differential equations," 2012 New England Numerical Analysis Day, April 2012.
- "Fast direct solvers for elliptic partial differential equations," ICIAM, July 2011.
- "Fast direct methods for solving discretized elliptic partial differential equations," CSUN, November 2010.

Presentations

- "A fast algorithm for constructing the solution operator for homogeneous elliptic boundary value problems," SIAM Conference on Applied Linear Algebra, June 2012.
- "A high-order accurate discretization scheme for elliptic partial differential equations," ICIAM, July 2011.
- "LU Factorization of Finite Difference Matrices in $O(N)$ Operations," SIAM Conference on Computational Science and Engineering, Febuaury 2011.
- "Fast Computation of Schur Complements of Large Finite Difference Matrices," SIAM Annual Conference, July 2010.
- "Sublinearly Fast Solvers for Finite Difference Operators on Mostly Structured Grids," SIAM Conference on Applied Linear, October 2009.
- "A discontinuous Galerkin method based on oscillated finite elements and Lagrange multipliers for solving Helmholtz problems," 7th International Conference on Mathematical and Numerical Aspects of Wave Propagation, June 2005.

Posters

- "A fast direct solution technique for two-dimensional quasi-periodic fields," Challenges in Geometry, Analysis, and Computation: High-Dimensional Synthesis Conference at Yale University, June 2012.
- "A linear complexity direct solver for integral equations on one-dimensional domains," 40 Years and Counting Poster Session: AWMs Celebration of Women in Mathematics, September 2011.

Professional Activities

Co-organize the Applied and Computational Mathematics Seminar at Dartmouth College, 2012-present

SIAM member

Association for Women in Mathematics (AWM) member

Referee for SIAM Journal on Scientific Computing (SISC), and SIAM Journal on Matrix Analysis and Applications (SIMAX)

Organizer and faculty advisor of the Dartmouth SIAM Student Chapter

Teaching Experience

- Instructor Math 126 (Topics in Applied Mathematics: Partial differential equations) at Dartmouth College, January-March 2013
- Instructor Math 23 (Differential Equations) at Dartmouth College, January- June 2012.
- Instructor Math 8 (Calculus II) at Dartmouth College, September- December 2011.
- Teaching Assistant for Calculus II at CUB, September 2007 - May 2008.
- High school substitute teacher, Antelope Valley Union High School District, September 2006-June 2007.
- Teaching Associate (Instructor) for College Algebra at CSUN, September 2005 - June 2006.
- Teaching Assistant for Preparing Undergraduates through Mentoring toward PhDs (PUMP) Summer Research Institute at CSUN, July 2005 and July 2006.
- Math Tutor at Math Support Services in Santa Clarita, CA, August 2000-July 2001 and August 2002-July 2003.

References

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Leslie Greengard
Courant Institute
New York University
251 Mercer Street
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Dwight Lahr (Teaching recommendation)
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Extracurricular

- Volunteer for Sonia Kovalevsky Math Day at Dartmouth College 2011.
- Volunteer at the Humane Society of Boulder Valley (2008-2010).

December 28, 2012