

**PETER A. MULLER**

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EDUCATION

**Rensselaer Polytechnic Institute**, Troy, New York, Ph.D. in Mathematics, Aug. 2014

*Numerical Methods of Electrical Impedance Tomography*. Advisor: Dr. David Isaacson

**Rensselaer Polytechnic Institute**, Troy, New York, MS in Applied Mathematics, May 2012

Advisor: Dr. David Isaacson

**Fordham University**, New York, New York, BS in Mathematics and French Lang. & Lit., May 2010

Advisor: Dr. Frederick Marotto (Math) and Dr. Andrew Clark (French)

RESEARCH INTERESTS: Nonlinear inverse problems, Complex geometrical optics, Numerical solutions to PDEs, Numerical Analysis, Electrical impedance tomography, Mathematical Modeling, Medical imaging

PUBLICATIONS

- **P. A. Muller**, J. L. Mueller, and M. M. Mellenthin, *Real-time Implementation of Calderón's method on a subject-specific domain*, IEEE Trans. Med. Imaging, To appear 2017
- J. L. Mueller, M. M. Mellenthin, **P. Muller**, R. R. Deterding, and S. D. Sagel, "Electrical Imaging of Patients with Cystic Fibrosis," in *Proc. of the NIH-IEEE 2015 Strategic Conf. on Healthcare Innovation and Point-of-Care Technologies for Precision Medicine*, 2015
- **P. A. Muller**, T. Li, D. Isaacson, J. C. Newell, G. J. Saulnier, T.-J. Kao, and J. Ashe, *Estimating a regional ventilation-perfusion index*, Physiological Measurement, v36, pp. 1283-1295, 2015
- **P. Muller**, D. Isaacson, J. Newell, G. Saulnier, "A Finite difference solver for the D-bar equation," in *Proc. of the 15<sup>th</sup> Int. Conf. on Biomedical Applications of Electrical Impedance Tomography*, p. 26, Gananoque, Canada, 2014
- **P. A. Muller**, D. Isaacson, J. C. Newell, and G. J. Saulnier, *Calderón's method on an elliptical domain*, Physiological Measurement, v34, pp. 609-622, 2013
- M. M. Mellenthin, J. L. Mueller, E. D. L. B. de Camargo, F. S. de Moura, T. B. R. Santos, R. G. Lima, S. J. Hamilton, **P. A. Muller**, and M. Alsaker, *The ACE1 electrical impedance tomography system for thoracic imaging*, submitted 2016
- B. Chisholm, **P. A. Muller**, A. Horn, and Z. Ellis, *Modeling the spread of a divisive idea*, In preparation

INVITED TALKS

- "Direct Image Reconstruction Methods in Electrical Impedance Tomography," Virginia Commonwealth University, Feb. 2017
- "Using Mathematics to Meet the Real-world Needs of Electrical Impedance Tomography," Virginia Military Institute, Jan. 2017
- "Electrical Impedance Tomography: The Mathematics of a Developing Medical Imaging Technique," The College of New Jersey, Dec. 2016

- “A 3-D Analogue to the 2-D D-bar Method,” minisymposium Nonlinear Mathematics of Electrical Impedance Imaging, SIAM Conference on Imaging Sciences, May 2016
- “3-D Electrical impedance imaging,” Colorado State University, Inverse Problems Seminar, Sept. 2015
- “3-D Electrical Impedance Imaging,” minisymposium Advances in Electrical Impedance Tomography Imaging: Algorithms and Experimental Results, Applied Inverse Problems Conference, May 2015
- “Estimating a Ventilation-Perfusion Index Using EIT,” minisymposium Advances in Electrical Impedance Tomography Imaging: Algorithms and Experimental Results, Applied Inverse Problems Conference, May 2015
- “A Finite Difference Solver for the D-bar Equation,” Presenter & Organizer, AMS Special Session on Inverse Problems, Joint Mathematical Meetings, Jan. 2015
- “Mathematics of medical imaging,” Colorado State University, First-Year Seminar in Mathematical Sciences, Sept. 2014
- “A finite difference approach to solving D-bar problems,” Colorado State University, Inverse Problems Seminar, Sept. 2013

#### CONFERENCE ACTIVITY/PARTICIPATION

- Joint Mathematics Meetings, Jan. 2017, Attendee
- Annual Pediatrics Poster Session at Children’s Hospital of Colorado, May 2016, “Electrical Impedance Tomography for Pulmonary Function Testing in Cystic Fibrosis Patients,” Poster
- 15th Int. Conf. on Biomed. Appl. of Electrical Impedance Tomography, April 2014, “A Finite Difference Solver for the D-bar Equation,” Contributed Talk
- School of Science Grad. Student Symp., March 2014, “A novel approach to solving the D-bar equation,” Contributed Talk
- School of Science Grad. Student Symp., April 2013, “Calderón’s method on an elliptical domain,” Poster
- CBMS Conf. on Mathematical Methods of Computed Tomography, May 29-June 2 2012, Participant
- Workshop at American Inst. of Math., Feb. 2012, “Systems Approaches to drug discovery and development in oncology,” Participant
- Annual School of Science Symposium at RPI, April 2011, “Spectral Theory of Mêlé Graphs,” Poster
- Research Fair at Fordham University, April 2010, “Newton, Leibniz and the Development of Calculus,” Poster
- Research Fair at Fordham University, Nov. 2009, “Spectral Theory of Mêlé Graphs,” Poster
- Research Fair at Fordham University, April 2009, “Chaos in a Simple Price-Demand Model,” Poster

#### RESEARCH EXPERIENCE

**Postdoctoral Research Fellow, Department of Mathematics, CSU, Fort Collins, CO, Aug. 2014-Present**

- Applying complex geometrical optics solution methods to synthetic aperture radar under Dr. Margaret Cheney.
- Working with Dr. Jennifer Mueller on Electrical Impedance Tomography:
  - Producing a 3-D direct reconstruction method for experimental use.
  - Evaluating the applicability of electrical impedance tomography for identifying lung pathologies in patients at Children’s Hospital of Colorado.
  - Collecting subject data in the lab and hospital setting.
  - Analyzing collected data.

**Research Assistant, Department of Mathematical Sciences, RPI, Troy, NY, Sept. 2011-Aug. 2014**

- Worked on dissertation research, particularly in the area of electrical impedance imaging of lung functioning under the supervision of Dr. D. Isaacson (Math), Dr. G. Saulnier (EE), and Dr. J. Newell (BME).
- Developed a numerical method for solving the 2-D  $\bar{D}$  equation.
- Created an implementation of Calderón's method for use with non-circular domains.
- Participated in weekly group research meetings, where each member discusses their current work and progress.

**NSF Summer REU Participant, University of Wyoming, Laramie, WY, Summer 2009**

- Collaborated with two other undergrads to develop and analyze *mêlé* graphs, a combination of discrete graphs and quantum graphs under the supervision of Dr. J. Selden.
- Attended weekly group progress meetings, where each group presented their work to date and suggestions were made for each group to move forward.
- Gained an understanding of bridging the gap between discrete and continuous mathematics.

**Campion Summer Research Fellow, Fordham University, New York, NY, Summer 2008**

- Analyzed the chaotic behavior of a discrete price-demand model under the supervision of Dr. F. Marotto.

UNDERGRADUATE RESEARCH/MENTORING

- Development of numerical PDE solver for 3D EIT project
  - Visiting international student from Brazil
- Modeling an *in-vivo* HIV infection
  - Biology major, now a math-bio minor
- Social epidemiology modeling project
  - Three honors students
  - In preparation for publication

FUNDING HISTORY

- 1R21EB016869-01, NIH/NIBIB, 09/01/13-Present  
*EIT: a non-radiating functional imaging method for cystic fibrosis*  
Role: Postdoctoral Researcher
- 1R01HL109854-01, NIH, 01/01/12-12/31/13  
*A Noninvasive Real-time Monitoring System for Pulmonary Function Assessment*  
Role: Graduate Research Assistant

HONORS/AWARDS

- SIAM Student Chapter Certificate of Recognition, April 2013
- Recipient of Ralph E. Huston Prize for teaching excellence, May 2012
- Member of the National Honor Society, Phi Beta Kappa
- Member of the National Jesuit Honor Society, Alpha Sigma Nu
- Member of the National Mathematics Honor Society, Pi Mu Epsilon
- Member of the National French Honor Society, Pi Delta Phi
- Member of the Scientific Research Society, Sigma Xi

- Recipient of the Dean's Scholarship at Fordham University
- Recipient of the Champion Summer Fellowship, summer 2008
- Dean's List all semesters at Fordham University

### TEACHING EXPERIENCE

#### **Instructor, Department of Mathematics, CSU, Fort Collins, CO, Fall 2014-Present**

- Honors Introduction to Ordinary Differential Equations (MATH 340) – Spring 2017
- Introduction to Ordinary Differential Equations (MATH 340) – Fall 2016
- Honors Introduction to Ordinary Differential Equations (MATH 340) – Spring 2016
- Mathematics for Scientists and Engineers (MATH 530) – Fall 2015
- Calculus for Biological Scientists (MATH 155) – Spring 2015
- Introduction to Ordinary Differential Equations (MATH 340) – Fall 2014

#### **Teaching Assistant, Department of Mathematical Sciences, RPI, Troy, NY, Spring 2014**

- Formulated Calculus problems for Massive Online Open Course
- Wrote Perl scripts for Massive Online Open Course
- Created videos for Massive Online Open Course for Calculus

#### **Seminar Coordinator, Department of Mathematical Sciences, RPI, Troy, NY, Spring 2014**

- Supervised the Introduction to Research in Mathematics Seminar
- Assessed the performance of graduate students in the seminar
- Ensured seminar speakers are prepared for their presentations

#### **Instructor, Department of Mathematical Sciences, RPI, Troy, NY, Fall 2011**

- Organized the Teaching Seminar for TAs course
- Mentored first-year teaching assistants during their first semester of teaching
- Provided insight and advice for successful teaching
- Observed recitations led by new teaching assistants

#### **Instructor, Department of Mathematical Sciences, RPI, Troy, NY, Summer 2011**

- Taught Calculus 1 during the first summer session at RPI
- Worked with students who had previously failed the course or wanted to improve an unsatisfactory grade, all of whom received an A or B at the end of the course
- Prepared daily lectures, homework assignments, and exams, hold office hours

#### **Teaching Assistant, Department of Mathematical Sciences, RPI, Troy, NY, Aug. 2010-Dec. 2011**

- Teaching Assistant for Calculus for Calculus 1, Fall 2010 and Spring 2011
- Teaching Assistant/Grader for Mathematical Analysis 1, Fall 2011
- Lead four recitation sessions per week where homework problems were discussed as well as other student questions
- Graded homework, quizzes, and exams and maintaining the class gradebook
- Worked with math mentors (undergraduate students who help with skills quizzes) to prepare them for helping other students in calculus

**Tutor, Fordham University Higher Education Opportunity Program, NY, NY, Sep. 2007-May 2010**

- Tutored for all levels of calculus courses to students in the HEOP at Fordham University
- Met individually with students on a schedule based on the student's needs to re-enforce ideas from class
- Discussed problems and examples with which the student struggled
- Followed up with student and a HEOP counselor to discuss the student's progress

SERVICE/ACTIVITIES/LEADERSHIP

- **Assistant coach** to Putnam Exam Practice Seminar, Fall 2016-Present
- **Referee** for *Inverse Problems, Inverse Problems and Imaging, Physiological Measurement, Measurement Science and Technology, IEEE Transactions on Medical Imaging, IEEE Transactions on Computational Imaging*, Fall 2014-Present
- **Volunteer** for CSU Math Department's Math Day competition for high schoolers, Fall 2015-Present
- **Co-organizer** of the Graduate Student Workshop on Inverse Problems at CSU, August 2016
- **Poster Judge** at CSU Graduate Student Showcase, Feb. 2015
- **Presenter** at Blevins Middle School's Science Days talks to seventh grade science students, Feb. 2015
- **Co-organizer** of an AMS special session on "Inverse Problems" at the Joint Mathematical Meetings, Jan. 2015
- **Head graduate coach** for Undergraduate Mathematical Contest in Modeling, Sept. 2011-Feb. 2014, attend weekly practices, supervise and advise teams during problem solving sessions
- **Graduate Student Senator**, May 2013-April 2014, serve on Facilities and Services Committee, attend general body meetings, support the needs of RPI students
- **Member of the Graduate Student Council**, May 2013-April 2014, organize graduate student events, address graduate student concerns/issues
- **Math Department Graduate Student Representative**, May 2012-May 2013, attend departmental graduate committee meetings, vote on student appeals
- **Secretary for SIAM's RPI chapter**, Sept. 2011-May 2012, attend weekly meetings, plan inviting speakers to campus, organize student activities, record meeting notes
- **Co-founder and co-president** of Colleges Against Cancer's Fordham University chapter, Sept. 2009-May 2010, chair American Cancer Society's Relay for Life event at Fordham's Manhattan campus, organize campus involvement in Making Strides Against Breast Cancer, raise awareness about cancer and cancer prevention
- **Teacher's assistant** for a fourth grade class at PS 111, New York, NY, Sept. 2008-May 2009, assisted students struggling with math and reading, supervise class field trips
- **Programming co-chair and Ambassador** of Fordham University's Lincoln Center Society, Sept. 2007-May 2010, create weekly schedule for tour guides, conduct campus tours for prospective and admitted students, respond to questions about student life, classes, and extracurricular activities

COMPUTER SKILLS

- Proficient in MATLAB, LaTeX, and HTML
- Experience with MAPLE, Mathematica, and C++
- Computing courses taken: Computer Science I and II, Numerical Analysis, Computational Linear Algebra, Numerical Solutions to ODEs, Numerical Solutions of PDEs, Finite Element Analysis

PROFESSIONAL AFFILIATIONS

- Member of SIAM
- Member of SIAM Activity Group on Imaging Science
- Member of AMS
- Member of IEEE