

Liliana Borcea

Computational and Applied Mathematics, MS 134
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Education

- 1994-1996 **Stanford University**
Ph.D. in Scientific Computing and Computational Mathematics
- 1992-1994 **Stanford University**
M.S. in Scientific Computing and Computational Mathematics
- 1982-1987 **University of Bucharest, Department of Applied Physics**, Romania
“Diploma de inginer”, equivalent to an M.S. in Physics

Dissertation: “Direct and inverse problems for transport in high contrast media”

Honors and awards

- April 2012 Selection for SIGEST section of December 2012 SIAM Review to reprint the paper
Filtering deterministic layer effects in imaging SIAM MMS, 7 (2009), 1267-1301.
- May 2011 National Academies Keck Futures Initiative Award.
- Fall 2010 NSA Research Professorship, MSRI Berkeley.
- 04/2007 Invited plenary speaker, AMS West Section Meeting, Tucson, AZ.
- 03/2006 Invited speaker, College de France, Paris.
- 08/2005 My NSF supported research on imaging in random media was selected by the
NSF Applied Math program as a research highlight. It was also used in the
NSF budget request to Congress.
- 07/2004 Invited topical speaker, SIAM Annual meeting, Portland, OR
- 12/2001 Outstanding Paper by a Young Presenter in Signal Processing at
the Acoustical Society of America meeting, Fort Lauderdale, FL.
- 1996-1999 NSF Mathematical Sciences Postdoctoral Research Fellowship.
- 1994-1996 NSF Graduate Research Traineeship.
- 1992-1993 Stanford NASA Ames Global Change fellowship.
- 1983 Laureate of the national contest “Traian Lalescu” between all Romanian
Physics Universities.
- 1982 Laureate of the Romanian national Olympics in Physics.

Employment

- 2007-present **Rice University**
Noah Harding Professor, Computational and Applied Mathematics.
- 2001-2007 **Rice University**
Associate Professor, Computational and Applied Mathematics.
- 1996-2001 **Rice University**

1996-1997 Assistant Professor, Computational and Applied Mathematics.
California Institute of Technology
 NSF Postdoctoral fellow in the Applied Mathematics Department.

1992-1993 **Stanford University and NASA Ames**, Moffet Field, California
 Research assistant.

1991-1992 **NASA Ames**, Moffet Field, California
 Research assistant.

1987-1990 **IPIM “13 Decembrie”**, Sibiu, Romania
 Computer programmer.

Visiting positions

July-Dec 2006 **Stanford University, Mathematics**. Visiting Professor

Feb-July 2006 **INRIA Rocquencourt, France, Project POEMS**. Visiting Professor

May-June 2005 **Istituto per le Applicazioni del Calcolo, Firenze, Italy**. Visiting Professor.

Fall 2003 **IPAM, UCLA**. Invited core participant in the special semester:
 Inverse Problems. Computational Methods Emerging Applications

August 2003 **University of Jyväskylä, Finland, Mathematics**. Visiting Professor.

2000-2001 **Stanford University, Mathematics**, Visiting Faculty

Editorial positions

Editorial board SIAM Journal on Multiscale Modeling and Simulations.

Editorial board SIAM Journal on Uncertainty Quantification.

International Advisory Panel of the journal Inverse Problems.

Editorial board Applied Mathematics Letters.

Professional activities

- **National and International committees**

- Scientific Advisory Board of the National Academy of Finland, for the Center of Excellence in Inverse Problems Research, 2012-2017.
- Elected chair of SIAM Imaging Science Activity Group, Jan 1, 2010- Dec 31, 2011.
- Chair of the SIAG Imaging Science Committee for nominating candidates for future SIAG Officers.
- Member of the SIAM di Prima prize committee, 2011-2012.
- Elected member at large of the IPIA (Inverse Problems International Association), 2010-2012.
- AWM-SIAM Kovalevsky lecture committee, chair (2006-2007) member (2005-2006).
- SIAM student travel awards committee, member (2004).

- **Organizer of conferences and workshops**

- Computational Inverse Problems workshop ID 1243, Oberwolfach, October 21-27, 2012.
- Conference on Applied Inverse Problems 2011, College Station, TX. Steering committee.
- SIAM Imaging Conference, April 12-14, 2010, Chicago. Organizing committee.
- MSRI Semester on Inverse Problems and Applications, August 16, 2010 - December 17, 2010. Co-organizer with M. de Hoop, P. Kuchment, L. Päivarinta, C. Kenig, M. Zworski and G. Uhlmann.
- ICIAM minisymposia review committee, Vancouver, 2011.
- Waves 2009, The 9th international conference on Mathematical and numerical aspects of Waves, June 15-19, 2009, Pau France. Scientific committee.
- NSF/CBMS Regional Conference in Mathematical Sciences - Imaging in Random Media, May 12-16, 2008. PI. (Dan Sorensen and William Symes are CO-PI's).
- Conference on Applied Inverse Problems 2007: Theoretical and Computational Aspects, June 25-29, 2007, Vancouver, Canada. Steering committee.
- Co-organized with G. Papanicolaou and C. Tsogka the Oberwolfach Seminar: Mathematical and Computational Problems in Interferometric Imaging, June 4 - 10, 2006.
- Co-organized with G. Uhlmann the Inverse Problems Workshop in MSRI, Berkeley, August 13-24, 2001.

- **Recent mini-symposia organizer**

- Imaging with waves in complex environments. SIAM Imaging Science Conference, Chicago, April 19, 2010. Josselin Garnier and Knut Solna co-organizers.
- Topics in imaging with waves. Minisymposium at the SIAM Conference on Imaging Sciences, San Diego, July 7-9, 2008. F. Guevara Vasquez and G. Papanicolaou are co-organizers.
- Inverse Problems for Wave Propagation, Conference on Applied Inverse Problems 2007: Theoretical and Computational Aspects, June 25-29, 2007, Vancouver, Canada.
- Inverse Problems for Wave Propagation, AMS, Spring 2007 West Section Meeting, Tucson, AZ, April 21-22, 2007
- Optimal parametrizations for forward and inverse problems in Geophysics, co-organized with V. Druskin, July 2004, SIAM Annual meeting, Portland, OR.
- Imaging and time reversal in random media at the Applied Inverse Problems: Theoretical and Computational Aspects conference, UCLA Lake Arrowhead, May 18-23, 2003.

- **Referee**

- Participated in NSF Applied Mathematics Panels and reviewed various, additional Applied Mathematics NSF proposals.
- Proposal referee for MITACS-Canada, Fund for Scientific Research-Flanders, Academy of Finland and the Austrian Science Fund.
- Referee for various papers in SIAM Journal on Applied Mathematics, SIAM Journal of Numerical Analysis, SIAM Journal on Multiscale Analysis, Inverse Problems, Inverse

Problems in Engineering and Control, Inverse Problems in Science and Engineering, IEE Medical Imaging, Optimization and Calculus of Variations, Journal of Applied Mechanics, International Journal of Solids and Structures, International Journal of Engineering Science, Smart Materials and Structures, Transactions on Medical Imaging and Waves in Random Media.

- Member of the Society for Industrial and Applied Mathematics

Mentoring and outreach activities

1. Co-chair of the ADVANCE Climate and Retention Committee, Rice University, 2007-2010.
2. Co-chair, Faculty Career Success workshop for junior faculty in science and engineering, Rice University, April 19, 2008 and April 19, 2010.
3. Advance Mentoring Committee of Women Faculty in Rice, 2007.
4. Panelist at the Texas Leadership Conference “Using Modeling, Visualization and Data Management as Tools for Transferring Current Research Into High School Mathematics and Science”, Rice University, March 8-9, 2002.
5. Society of Women Engineers Mentoring Program, Rice University, Spring 1999 and 2000.

Recent research grants

- AFSOR FA9550-12-1-0117, (04/01/12-03/31/15).
project: Mathematical Problems in Imaging in Random Media. (PI. No Co-PI).
- ONR N000141210256, (01/15/2012-09/30/2014).
project: Theory and Algorithms for Sensor Array Imaging and Motion Estimation in Random Media. (PI. No Co-PI).
- NSF DMS-0907746 (09/15/2009-08/31/2012).
Title of project: Mathematical Problems and Adaptive Algorithms for Imaging in Random Media. (PI. No Co-PI).
- NSF DMS-0934594 (09/15/2009-08/31/2012).
Title of project: CMG COLLABORATIVE RESEARCH: Subsurface Imaging and Uncertainty Quantification. (PI. P.Kitanidis (Stanford), W. Barrash (Boise) and F. Guevara-Vasquez (Utah) CO-PIs.)
- ONR N00014-09-1-0290 (10/01/2008-09/30/2011).
Title of project: “Theory and Adaptive Algorithms for Imaging in Random Media”. (PI. No Co-PI).
- Schlumberger-Doll Research agreement, began January, 2007.
Title of project: “Targeted discrete approximations for resistivity inversion.” (PI. No Co-PI).
- NSF DMS0604008 (08/01/2006-07/31/2009)
Title of project: “Mathematical Problems in Imaging in Random Media”. (PI. No Co-PI).

- ONR N00014-05-1-0699 (08/01/2005-07/31/2008)
Title of project: “ Robust interferometric imaging in cluttered environments”. (PI. No Co-PI).
- NSF-FRG DMS: 0354658 (07/31/2004-07/31/2007)
Title of project: “Collaborative research FRG: Time reversal techniques in wireless communications.”. (PI. G. Papanicolaou and A. Paulraj (Stanford) Co-PI’s).

Tutorials and Short courses

1. Imaging and wave propagation in random waveguides (3 lectures), Session ”Etats de la Recherche” Inverse Problems and Imaging Société Mathématique de France Institut Henri Poincaré, 20 - 22 February, 2013.
2. Imaging in random waveguides (3 lectures), June 7-15, 2012, Workshop on waves and Imaging in random media, Heraklion, Greece.
3. Imaging in random media, Introductory workshop on Inverse Problems, (4 lectures) July 25-29, 2011, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK.
4. Discrete approaches to electrical impedance tomography, Special trimester on Inverse Problems, (6 lectures), June 13-17, 2011, University Autonoma, Madrid, Spain.
5. Imaging in random waveguides. Introductory workshop on Inverse Problems and Applications. MSRI, Berkeley, CA, August 23-27, 2010.
6. Imaging in random waveguides. Escuela Politécnica Superior, Universidad Carlos III de Madrid, Spain, June 2010.
7. Discrete approaches to electrical impedance tomography, Escuela Politécnica Superior, Universidad Carlos III de Madrid, Spain, June 2010.
8. Discrete approaches to electrical impedance tomography, Inverse Problems Graduate Student workshop, MSRI, Berkeley, CA, July 20-31, 2009.
9. Conference in honor of Alberto P. Calderón. IMPA, Rio de Janeiro, Brazil, January 10-19, 2007. Organizers: Antonio Sa Barreto and Gunther Uhlmann. Teaching a course on *Imaging in Random Media* (4 lectures).
10. Oberwolfach Seminar: *Mathematical and Computational Problems in Interferometric Imaging*, with G. Papanicolaou and C. Tsogka, June 4 - 10, 2006 (6 lectures + problem sessions).
11. Summer course on *Imaging in Random Media* (5 lectures), Istituto per le Applicazioni del Calcolo, Firenze, Italy, June 2005.
12. *Coherent Interferometric Array Imaging in Random Media*, part of the AMS short course: “The Radon transform, inverse problems and tomography”, the AMS annual meeting, Atlanta, January 3-4, 2005.
13. *Tutorial on Electrical Impedance Tomography* (4 lectures), September 11-12, 2003, IPAM.

14. *An introduction to electrical impedance tomography*, Summer minicourse (10 hours lectures), August 18-22, 2003, University of Jyväskylä, Finland.
15. *Electrical Impedance Tomography* (5 lectures) in the Inverse Problems Workshop in MSRI, Berkeley, August 13-24, 2001.

Invited Presentations

1. *Paraxial coupling of waves in 3-D random waveguides*, Recent developments in applied Mathematics, Conference in honor of George Papanicolaou's 70th birthday, January 24-27, 2013, Stanford, CA.
2. *Paraxial coupling of waves in 3-D random waveguides*, Workshop on Theory and Applications of Stochastic PDE's, January 14-18, 2013, IMA, Minneapolis.
3. *Imaging in random media*, Colloquim, University of Helsinki, October 17, 2012.
4. *Imaging in random media*, Conference in Inverse Problems in honor of Gunther Uhlmann, June 18-22, 2012.
5. *Detection and imaging with waves in strongly backscattering random media*, Workshop on wave propagation in complex media and applications, Heraklion, Greece, May 7-11, 2012.
6. *Detection and imaging with waves in strongly backscattering random media*, Department of Mathematics colloquim, University of Texas A&M, February 17, 2012.
7. *Detection and imaging with waves in strongly backscattering random media*, Challenges in Synthetic Aperture Radar, IPAM UCLA Workshop, February 6-10, 2012.
8. *Wave propagation in random waveguides*, Department of Mathematics colloquim, University of Houston, February 1, 2012.
9. *Imaging and wave propagation in random waveguides*, plenary lecture, PASI-CIPPDE 2012, Inverse Problems and PDE control, Santiago de Chile, Jan 23-27, 2012.
10. *Wave propagation in wave guides with random boundaries*, 2012 Electromagnetics Contractors Meeting organized by Dr. Arje Nachman from AFSOR, January 17-18, 2012, San Antonio, TX.
11. *Wave propagation in wave guides with random boundaries*, Workshop on Imaging, wave propagation in complex media, and optimal control under uncertainties, Ecole Normale Supérieure, Paris, 19-21, December 2011.
12. *Detection and imaging with waves in strongly backscattering random media*, Workshop on Random Matrix Theory for Wave Propagation in disordered media, University Paris 7, December 12, 2011.
13. *Detection and imaging with waves in strongly backscattering random media*, colloquim speaker, Department of Mathematics, University of Michigan, October 25, 2011.
14. *Detection and imaging in heterogeneous, strongly backscattering media*, Featured External Plenary Speaker, E&M Schlumberger Workshop, Sugarland, TX, September 15, 2011.

15. *Detection and imaging in heterogeneous, strongly backscattering media*, June 6, 2011, Workshop on Inverse Problems, University Autonoma, Madrid, Spain.
16. *Pulse propagation in time dependent randomly layered media*, Workshop on Computational Wave Propagation, Michigan State University, April 15-16, 2011.
17. *Source localization in random waveguides*, IPAM UCLA workshop on Random media, homogenization and beyond. January 24-28, 2011.
18. *Detection and imaging in heterogeneous, strongly backscattering media*, California Institute of Technology, Applied Mathematics colloquium, November 15, 2010.
19. *Detection and imaging in heterogeneous, strongly backscattering media*, MSRI-Evans lecture, Berkeley, CA, November 8, 2010.
20. *Imaging in random waveguides*, Numerical analysis of multiscale problems, London Mathematical Society Durham Symposia, Durham UK, July 5-15, 2010.
21. *Detection and imaging in heterogeneous, strongly backscattering media*, in section: Seismic and GPR Diffraction Modelling and Imaging, EAGE Barcelona, Spain, June 14-17, 2010.
22. *Source localization in random waveguides*, Inverse Problems Session, ECCM 2010, Paris, France, May 16-21, 2010.
23. *Detection and imaging in heterogeneous, strongly backscattering media*, Numerical Analysis Seminar, ICES, UT Austin, April 30, 2010.
24. *Source localization in random waveguides*, MIT Applied Mathematics colloquium, Cambridge, MA, April 7, 2010.
25. *Detection and imaging in heterogeneous, strongly backscattering media*, CAAM Rice Colloquium, March 22, 2010.
26. *Filtering random media effects for imaging*, WAVES-2009, June 15-19, 2009, Pau, France.
27. *Filtering random media effects for imaging*, Workshop on Adaptivity, robustness and complexity of multiscale algorithms Mar 30 - Apr 3, 2009, ICMS, Edinburgh, UK.
28. *Edge illumination and imaging of extended reflectors*, The Infmath Imaging Colloquium, University of Innsbruck, Austria, November 13, 2008.
29. *Filtering random medium effects in imaging*, Special Semester on Stochastics, Workshop on Inverse and Partial Information Problems, Linz, Austria, October 27-31, 2008.
30. *Filtering random medium effects in imaging*, Conference in honor of J. B. Keller's 85-th birthday, October 18,19, 2008, Stanford University.
31. *SNR enhancement for imaging in randomly layered media*, Stanford Applied Mathematics, July fest, July, 21, 2008.
32. *Imaging and velocity estimation in finely layered media*, NSF/CBMS Conference on imaging in random media, Rice University, May 14, 2008.

33. *Selective illumination and imaging of edges of extended reflectors*, University of Delaware, Department of Mathematics colloquium, May 2, 2008.
34. *Imaging in random media*, University of Vienna, Austria, Computational Mathematics colloquium, April 25, 2008.
35. *The continuum limit of discrete inverse spectral problems for Sturm-Liouville equations*, Rice University, Undergraduate conference, March 29, 2008.
36. *Layer annihilator for imaging and velocity estimation in finely layered media*, Workshop on waves and imaging in random media, SAMSI, North Carolina, Jan 30-Feb 1, 2008.
37. *Seeing through clutter*, University of Houston, PDE seminar, Nov 20, 2007.
38. *Seeing through clutter*, Rice University, Dean of engineering new professor lecture series, Oct. 10, 2007.
39. *Electrical impedance tomography with resistor networks*, Fields Institute, University of Toronto, Canada, Applied Math Seminar, May 9, 2007.
40. *Array imaging in random media*, Fields Institute, University of Toronto, Canada, Probability Seminar, May 10, 2007.
41. *Optimal waveform design for array imaging*, Texas A&M, College Station, Applied Math Seminar, April 30, 2007.
42. *Array imaging in random media*, plenary talk, AMS West Section Meeting, Tucson, AZ, April 21, 2007.
43. *Optimal Waveform Design for Array Imaging*, Schlumberger-Doll Research Center, Boston, Joint Schlumberger-Tufts seminar, Mar 8, 2007.
44. *Electrical impedance tomography on planar resistor networks*, University of Maryland, College Park, CSCAMM seminar, Feb. 21, 2007.
45. *Optimal Waveform Design for Array Imaging*, Rice University, CAAM Colloquium, Jan 29, 2007.
46. *Electrical impedance tomography on planar resistor networks*, UCLA, Applied Mathematics Colloquium, Dec. 6, 2006.
47. *Electrical impedance tomography on planar resistor networks*, UC Merced, Mathematics Colloquium, Dec. 1, 2006.
48. *Optimal Waveform Design for Array Imaging*, Stanford University, Linear Algebra - Optimization Seminar, Nov. 29, 2006.
49. *Electrical impedance tomography on planar resistor networks*, University of Washington, Seattle, Inverse Problems Seminar, Nov. 6, 2006.
50. *Imaging in random media*, UC Santa Barbara, Mathematics Colloquium, Oct. 6, 2006.

51. *Adaptive coherent interferometric imaging in cluttered environments and optimal waveform design*, DARPA Urban propagation workshop, San Diego, CA, Oct. 4-5, 2006.
52. *Adaptive Coherent Interferometric Imaging in Random Media*, The Inverse Problems and Applications workshop, Banff International Research Station (BIRS), Canada, August 19-24, 2006.
53. *Adaptive Coherent Interferometric Imaging in Random Media*, Institut Français de Petrole, Malmaison, France, June 20, 2006.
54. *Adaptive Coherent Interferometric Imaging in Random Media*, University of Erlangen, Germany, June 12, 2006.
55. *Optimal waveform design for active array imaging*, Séminaire du Laboratoire Ondes et Acoustique, ESPCI, Université Paris 7, May 4, 2006.
56. *Effective Properties of high contrast materials at high volume fraction*, Séminaire POEMS, ENSTA, Paris, April 27, 2006.
57. *Electrical impedance tomography on optimal grids. The two dimensional problem*, Séminaire Modelisation et Calcul Scientifique, INRIA, Rocquencourt, France, March 22, 2006.
58. *Adaptive Coherent Interferometric Imaging in Random Media*, College de France, Séminaire du Pr. Pierre-Louis Lions, March 10, 2006.
59. *Adaptive Coherent Interferometric Imaging in Clutter*, ICES Seminar, University of Texas at Austin, Dec 6., 2005.
60. *Adaptive Coherent Interferometric Imaging in Clutter*, the IMA Annual Program Year Workshop, Imaging form wave propagation, October 17-21, 2005.
61. *Theoretical and Computational Aspects of Statistically Stable Imaging in Random Media*, Inverse Problems Seminar, Ecole Polytechnique, Palaiseau, France, July 6, 2005.
62. *Theoretical and Computational Aspects of Statistically Stable Imaging in Random Media*, the Applied Inverse Problems Conference, UK, June 26-30, 2005.
63. *Optimal parametrizations for some ill posed inverse problems*, The Mathematics Seminar, University of Rome “La Sapienza”, June 15, 2005.
64. *Optimal parametrizations for the numerical solution of some ill-posed inverse problems*, University of Chicago, Mathematics Department Colloquium, March 9, 2005.
65. *Optimal parametrizations for the numerical solution of some ill-posed inverse problems*, Institute for Computational and Mathematical Engineering, Stanford University, Feb. 17, 2005.
66. *Optimal parametrizations of some inverse problems*, Mathematics Department seminar, Simon Fraser University, Vancouver, Canada, December 8, 2004.
67. *Robust interferometric imaging in random media*, ARCC workshop in time reversal and communications, American Institute of Mathematics, Palo Alto, CA, October 18-22, 2004.

68. *Optimal parametrizations of some inverse problems*, Mathematics Department seminar, University of Houston, September 1, 2004.
69. *On the convergence of discrete inverse Sturm-Liouville problems on optimal grids*, Invited topical speaker, SIAM annual meeting, Portland OR, July 12-16, 2004.
70. *Coherent interferometric array imaging in clutter*, IMA hot topics workshop on adaptive sensing and multimode data inversion, IMA, University of Minnesota, Minneapolis, June 27-30, 2004.
71. *On the convergence of discrete inverse Sturm-Liouville problems on optimal grids*, Rice University, March 15, 2004.
72. *On the convergence of discrete inverse Sturm-Liouville problems on optimal grids*, Inverse Problems Workshop, Nov 19, 2003, IPAM, UCLA.
73. *Imaging of extended targets in random media*, Applied Inverse Problems: Theoretical and Computational Aspects conference, UCLA (IPAM) organizers, Lake Arrowhead, CA, May 18-23, 2003.
74. *Imaging and time reversal in random media*, Department of Mathematics, Texas A & M, College Station, TX, November 25, 2002.
75. *Optimal finite difference grids for direct and inverse Sturm Liouville problems*, Computational Methods for Inverse Problems, Strobl, Austria, August 25-31, 2002.
76. *Nonlinear Multigrid Solution of the Inverse Complex Conductivity Problem*, Mummy Range workshop on electrical impedance tomography, Pingree Park, Colorado State University, August 1-7, 2002.
77. *Optimal finite difference grids for direct and inverse Sturm Liouville problems*, Workshop on Inverse Problems and Applications, Cortona, Italy, June 3-9, 2002.
78. *Imaging in random media*, Inverse Problems Workshop in MSRI, Berkeley, Nov 15, 2001.
79. *Imaging in noisy environments*, workshop in Heraklion, Crete, June 19-21, 2001.
80. *Imaging in Random Media*, Department of Mathematics, University of Arizona, Tucson, May 10, 2001.
81. *Nonlinear Multigrid Solution of the Inverse Complex Conductivity Problem*, Scientific Computing and Computational Mathematics, Department of Computer Science, Stanford University, April 9, 2001.
82. *Nonlinear Multigrid Solution of the Inverse Complex Conductivity Problem*, Department of Mathematics and Statistics, McGill University, Montreal, QC Canada, April 6, 2001.
83. *Nonlinear Multigrid for Electrical Impedance Tomography*, Computational and Applied Mathematics, Rice University, January 29, 2001.
84. *Nonlinear Multigrid for Electrical Impedance Tomography*, Applied Mathematics, Stanford University, October 13, 2000.

85. *Network approximations and imaging high contrast media. Electro-magnetic and elastic inverse problems.*, International Conference on Homogenization and Materials Science, in honor of U. Hornung, September 15-17, 2000, University of Akron. (L. Berlyand, A. Friedman (US organizers); M. Bedsoe, D. Cioranescu (Europe organizers)).
86. *Effective elastic properties of high contrast two phase composites at or near the percolation threshold*, Schlumberger-Doll Research Center, Ridgefield, CT, September 18-20, 2000.
87. *Nonlinear Multigrid Solution of the Inverse Complex Conductivity Problem*, Conference on Nonlinear Analysis, May 28-June 2, 2000 Courant Institute, New York.
88. *Nonlinear Multigrid Solution of the Inverse Complex Conductivity Problem*, Rensselaer Polytechnic Institute, Department of Mathematics, May 30, 2000.
89. *Imaging Electrical Conductivity (and Permittivity) of High Contrast Media with Low Frequency Electromagnetic Fields and On the Magneto-Elastic Properties of Elastomer-Ferromagnet Composites*, University of Akron, May 1-5, 2000. (Invited by the Department of Mathematics to give a week-long series of lectures.)
90. *On the Magneto-Elastic Properties of Elastomer-Ferromagnet Composites*, Department of Mathematics, University of Utah, December 9, 1999.
91. *Low frequency electromagnetics in high contrast media*, Workshop on "Mathematics of Imaging", MSRI, November 1-5, 1999.
92. *High contrast imaging*, EXXON, Houston, Texas, June 25, 1999.
93. *An asymptotic study of the Neumann to Dirichlet map in high contrast impedance tomography*, Inverse Problems Seminar of the Pacific Northwest, University of Washington, Seattle, May 15-16, 1999.
94. *On the Magneto-Elastic Properties of Elastomer-Ferromagnet Composites*, Department of Mathematics, University of Houston, April 30, 1999.
95. *Effective properties of composites with magnetically permeable inclusions*, One Day Conference on Scientific Computing, Stanford University, February 6, 1999.
96. *Asymptotic R-L-C Network Description of Electromagnetic Transport in High Contrast Media*, IUTAM Symposium 99/4; Mechanics and Electromagnetic Waves in Structured Media, Sydney, Australia, January 18-22, 1999.

Conference Minisymposia and Other Presentations

1. *A resistor network approach to electrical impedance tomography with partial measurements*, National Academy Keck Future Initiatives, Imaging Science Conference, Irvine, CA, November 16-19, 2010.
2. *Pulse propagation in time dependent randomly layered media*, Applied Inverse Problems Conference, May 2011, College Station, TX.

3. *Detection and imaging in heterogeneous, strongly backscattering media*, SIAM Imaging Science, Chicago, April 13, 2010.
4. *Source localization in random waveguides*, SIAM PDE Conference, Miami, Dec 2009.
5. *Filtering random media effects for imaging*, SIAM Conference on computational Science and Engineering, Mar 2-6, 2009, Miami.
6. *Layer annihilator for imaging and velocity estimation in randomly layered media*, SIAM Imaging Sciences, July 7-10, 2008, San Diego.
7. *Imaging in noisy waveguides*, 44th Annual Technical Meeting, Society of Engineering Science, October 21-24, 2007.
8. *Imaging in random media and optimal waveform design*, 44th Annual Technical Meeting, Society of Engineering Science, October 21-24, 2007.
9. *Optimal illumination for imaging in random media*, ICIAM 2007, Zurich, Switzerland, July 2007.
10. *Optimal illumination for imaging in random media*, Conference on Applied Inverse Problems, Vancouver, BC, Canada, June 2007.
11. *Optimal illumination for imaging in random media*, AMS West Section Meeting, Tucson, AZ, April 22, 2007.
12. *Optimal illumination for array imaging*, AFOSR meeting, January 13, 2006, San Antonio.
13. *Optimal illumination for array imaging*, AMS meeting, January 14, 2006, San Antonio.
14. *Optimal parametrizations for some ill posed inverse problems*, the Applied Inverse Problems Conference, UK, June 26-30, 2005.
15. *Optimal parametrizations for the numerical solution of some ill-posed inverse problems*, AMS-SIAM Special Session on Theoretical and Computational Aspects of Inverse Problems, AMS annual meeting, Atlanta, January 6, 2005.
16. *A resolution study of images in random media*, First Joint International Meeting between the American Mathematical Society (AMS) and the Real Sociedad Matematica Espanola, Seville, Spain, June 18-21, 2003.
17. *Imaging and time reversal in random media*, AMS Southeastern Sectional Meeting Baton Rouge, LA, March 14-16, 2003.
18. *Nonlinear multigrid for electrical impedance tomography*, Computational Imaging, IS&T/SPIE Symposium on Electronic Imaging Science and Technology, Santa Clara, CA, January 20-24, 2003.
19. *A variational approach for electrical impedance tomography*, AMS-UMI First Joint International Meeting, Pisa, Italy, June 12-16, 2002.

20. *Imaging in random media*, Acoustical Society of America Annual Meeting, Fort Lauderdale, FL., Dec 3, 2001.
21. *Nonlinear Multigrid Solution of the Inverse Complex Conductivity Problem*, First SIAM Conference on Computational Science and Engineering, September 21-24, 2000, Washington, D.C.
22. *Nonlinear Multigrid Solution of the Inverse Complex Conductivity Problem*, SIAM Annual Meeting, July 10-14, 2000, Puerto Rico.
23. *On the Magneto-Elastic Properties of Elastomer-Ferromagnet Composites*, Third SIAM Conference on Mathematical Aspects of Material Science, May 21-24, 2000, Philadelphia.
24. *Matching Pursuit for Imaging High Contrast Conductive Media*, The Fourth International Congress on Industrial and Applied Mathematics, Edinburgh, Scotland, July 5-9, 1999.
25. *A multiscattering series for impedance tomography in layered media*, The Fifth SIAM Conference on Mathematical and Computational Issues in the Geosciences, San Antonio, March, 1999. gunther@math.washington.edu
26. *High contrast inversion*, Earth Sciences Council Workshop on Global Solutions to Geophysical Inverse Problems, San Jose, California, February 5, 1999.
27. *An asymptotic network approximation of electromagnetic transport in high contrast conductive media*, SIAM Annual meeting, Toronto, Canada, July 13-17, 1998.
28. *Imaging High Contrast Media*, Second SIAM Conference on Mathematical Aspects of Material Science, May, 1997, Philadelphia.
29. *Network approximation of electromagnetic transport in high contrast media*, Fourth international conference on mathematical and numerical aspects of wave propagation, Golden, Colorado, June 1 - 5, 1998.

Publications

1. L. Borcea and J. Garnier, *Paraxial coupling of propagating modes in three-dimensional waveguides with random boundaries*, submitted 2012. Preprint arXiv:1211.0468.
2. L. Borcea, T. Callaghan, G. Papanicolaou, *Motion Estimation and Imaging of Complex Scenes with Synthetic Aperture Radar*, submitted 2012. Preprint arXiv:1210.6024v1.
3. L. Borcea, V. Druskin, A. Mamonov, M. Zaslavsky, *A model reduction approach to numerical inversion for a parabolic partial differential equation*, submitted 2012. Preprint arXiv:1210.1257.
4. L. Borcea, T. Callaghan, G. Papanicolaou, *Synthetic Aperture Radar imaging and motion estimation via Robust Principal Component analysis*, submitted 2012. Preprint arXiv:1208.3700v2.
5. R. Alonso, L. Borcea, J. Garnier, *Wave propagation in waveguides with random boundaries*, Communications in Mathematical Sciences, 11(1), 2012, pp. 233-267.
6. L. Borcea, *Interferometric imaging and time reversal in random media*, Springer Encyclopedia of Applied and Computational Mathematics, to appear.

7. Borcea, L., Mamonov, A. V., Guevara-Vasquez, F., *Study of noise effects in electrical impedance tomography with resistor networks*, to appear in *Inverse Problems and Imaging*, 2013. arXiv:1105.1183 [math-ph].
8. L. Borcea, V. Druskin, F. Guevara Vasquez, A. V. Mamonov, *Resistor network approaches to electrical impedance tomography*, solicited review, *Inside Out II*, MSRI Publications, Volume 60, 2012, p. 55-118.
9. L. Borcea, K. Solna, *Pulse propagation in time dependent randomly layered media*, SIAM Multiscale Modeling Simulations, to be submitted 2011.
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Postdoctoral adviser:

- Ricardo Alonso - NSF Postdoctoral fellow, 2009-2011.
- Thomas Callaghan - NSF VIGRE Postdoctoral fellow, 2010-2011.

Graduate Students:

- PhD thesis adviser:
 - **Current students:**
 - Sebastian Acosta, first year PhD student.
 - Wang Yingpei, PhD Thesis topic: *Imaging in high contrast media*.
 - **Students that completed the PhD:**
 - Leila Issa, PhD 2010, Computational and Applied Mathematics, Rice University. Now at Tensorcom, San Diego, CA. From October 2011, Assistant Professor at the Lebanese American University, Beirut, Lebanon. Thesis: *Source localization in cluttered acoustic waveguides*.
 - Alexander Mamonov, PhD 2010. MSRI Berkeley postdoc Fall 2010, Postdoc in Mathematics at UT Austin, 2010-2012. Thesis: *Resistor networks and Optimal Grids for the Numerical Solution of Electrical Impedance Tomography with Partial Boundary Measurements*.
 - Fernando Gonzalez del Cueto, PhD 2009, Computational and Applied Mathematics, Rice University. Defended his thesis in August 2008. Research Scientist, Shell, Houston. Thesis: *Filtering random effects for imaging and velocity estimation in layered media*.
 - Fernando Guevara-Vasquez, PhD 2007, Computational and Applied Mathematics, Rice University. Now Assistant Professor, Mathematics, University of Utah. Thesis: *On the parametrization of ill posed inverse problems arising from elliptic partial differential equations*.
 - Erric Dussaud (co-advised with Bill Symes), PhD 2006. Now at Total, Pau, France. Thesis: *Velocity analysis in the presence of uncertainty*.
 - Genetha Gray, PhD 2002, Computational and Applied Mathematics, Rice University. Permanent staff member at Sandia, Livermore, CA. Thesis: *A Variational Study of the Electrical Impedance Tomography Problem*.
- Master thesis adviser:
 - Ricardo Gallardo, 2012. Master Thesis: *SAR imaging of moving targets*.
 - Leila Issa, 2007, *Imaging in cluttered acoustic waveguides*.
 - Fernando Gonzalez del Cueto, 2005, *Wave Propagation in Randomly Layered Media with an Application to Time-Reversal*.
 - Fernando Guevara-Vasquez, 2005, *Optimal Parameterization of Inverse Problems Arising from Elliptic Partial Differential Equations*.

Industry Collaborations: Schlumberger Doll Research Center, Ridgefield, CT.

Summer industry internships for my students:

- In Schlumberger Doll: Alexander Mamonov, Summers of 2007-2009 and Fernando Guevara Vasquez, Summer of 2005, Ricardo Gallardo, Summer 2011.
- In Shell, Houston: Fernando Gonzales del Cueto, Summers 2006-2008.