Guillaume Bal

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Education

Ph.D. in Applied Mathematics, University of Paris VI, France - 1997
Diploma, Ecole Polytechnique, Paris, France - 1993

Professional Experience

- Professor, Columbia University, 2008-present.
- Associate Professor, Columbia University, 2003-2008.
- Visiting scholar, Institute for Pure and Applied Mathematics, UCLA campus, fall 2003.
- Assistant Professor, Columbia University, 2001-2003.
- L.E. Dickson Instructor, University of Chicago, 1999-2001.
- Postdoctoral research associate, Stanford University, 1997-1999.
- Research associate, Electricité de France, Clamart, France, 1994-1997. Preparation of Ph.D. thesis "Coupling of Equations and Homogenization in Neutron Transport". Adviser: Professor Yvon Maday, Paris VI, France.

Research Interests

Partial Differential Equations. Equations with random coefficients. Wave and particle propagation in heterogeneous media. Mathematical and numerical analysis of Inverse Problems. Analysis and numerical simulation of forward and inverse transport equations. Applications in medical imaging and geophysical imaging.

Awards

Calderón Prize 2011.

Alfred P. Sloan Fellow, September 2003.

NSF Grant DMS-0239097 "CAREER: Time Reversal and Inverse Problems in Wave and Particle Propagation" September 2003 - August 2008.

The Jean-Pierre Lepetit Prize 1998, best PhD thesis defended at the Direction des Etudes et Recherches d'Electricité de France (EDF), France.

Grants

NSF Grant DMS-1108608 "Equations with random coefficients and Inverse Problems" July 2011 - July 2014.

AFOSR Grant NSSEFF- FA9550-10-1-0194 "Mathematical Modeling in Random media - From homogenization to Stochasticity" (PI Lenya Ryzhik, Stanford) May 2010 - May 2015

DOE Grant DE-FG52-08NA28779 "Monte Carlo and Deterministic 3D radiative transfer" (co-I Anthony Davis, JPL) October 2008 - October 2011.

NSF Grant DMS-0804696 "Partial Differential Equations with random coefficients and Inverse Problems" July 2008 - July 2011.

NSF FRG Grant DMS-0554097 "Inverse Problems in Transport Theory" September 2006 - August 2009.

DARPA-ONR Grant N00014-04-1-0224"Time reversal of Electromagnetic Waves" February 2004 - July 2008.

ONR Grant N00014-02-1-0089 "Time Reversal for Waves in Random Media" November 2001 - October 2004.

NSF Grant DMS-0072008 (renamed DMS-0233549)"Derivation and Simulation in Radiative Transfer Theory" July 2000 - July 2003.

Professional activities

AMS, SIAM, member.
Associate Editor: Discrete and Continuous Dynamical Systems (DCDS-B) 2006-2011
Associate Editor: Kinetic & Related Models (KRM) 2007-
Associate Editor: Inverse Problems and Imaging (IPI) 2009-
Associate Editor: Multiscale Modeling and Simulation (MMS) 2012-
Advisory Panel: Inverse Problems (IP) 2008-

Teaching and Mentoring Experience

Columbia University (2001-present): teaching of undergraduate and graduate courses in PDE's, functional analysis, numerical analysis, inverse problems, homogenization theory, waves in random media. University of Chicago (1999-2001): teaching of undergraduate courses in Complex variable theory, Vector field theory, Fourier methods, and introduction to ODE's and PDE's. Stanford University: Lectures on Transport Equations (graduate level), 1999. University of Paris VI: Lectures on numerical implementation in Pascal, course on Linear Algebra, licence of Applied Mathematics, 1995-1997.

Graduate Students:

Kui Ren, Graduated in Dec. 2005 (Assistant Professor, University of Texas at Austin).
Ramón Verástegui, Graduated in Dec. 2005 (Société Générale, New York).
Nick Hoell, Graduated in May 2011 (Postdoctoral fellow, University Toronto, Canada).
Wenjia Jing, Graduated in May 2011 (Postdoctoral Fellow, Ecole Normale Supérieure, Paris).
François Monard.
Will Martin.
Ningyao Zhang.
Chenxi Guo.
Yu Gu.

Postdoctoral researchers:

Olivier Pinaud. Fall 2003- Fall 2005 (Assistant Professor University Lyon, France).
Kui Ren. Fall 2005 - Summer 2007 (Assistant Professor University of Texas at Austin).
Alexandre Jollivet. Fall 2007 - Fall 2009 (Chargé de Recherche CNRS, France).
Ian Langmore Fall 2008 - Fall 2011 (Opera Solutions, New York).
Cédric Bellis. Winter 2011 - .
Sébastien Impérial. Winter 2012 - .

Undergraduate students:
Philippe Moireau, Ecole Polytechnique (Summer 2003).
Oleg Polyakov, Columbia University (Summer 2005).
Rosalia Wong, Columbia University (Summer-Fall 2006).
François Monard, SUPAERO, France (Spring 2007).
Stan Snelson, Columbia University (Fall 2007- Spring 2009).
Clément Ray, Ecole Centrale Paris (Spring 2009).
Thomas Boulier, Ecole Polytechnique (Summer 2009).
Xavier Arhan, ENS Cachan (Spring 2011).
Tristan Agaësse, Ecole Centrale and EADS (Spring 2012).

Seminars

Mathematics Colloquium, University College London, London, UK, October 2011.

Physics Colloquium, Queens College, New York, October 2011.

Inverse Scattering Seminar, University Delaware, Newark, DE, May 2011.

Mathematics Colloquium, University of Texas at Arlington, April 2011.

Applied Mathematics Colloquium, Purdue University, West-Lafayette, Indiana, April 2011.

Applied Mathematics Colloquium, University of Arizona, Tucson, February 2011.

Applied Mathematics Colloquium, New Jersey Institute of Technology, February 2011.

Applied Mathematics Colloquium, University of Pennsylvania, October 2010.

Applied Mathematics Colloquium, Penn State University, September 2010.

Applied Mathematics Colloquium, University Cergy-Pontoise, France, July 2010.

Applied Mathematics Colloquium, CERMICS, France, July 2010.

Mathematics Colloquium, University Central Florida, Orlando, April 2010.

Applied Mathematics seminar, University Texas Austin, March 2010.

Analysis seminar, ENS, Paris, March 2010.

Applied Mathematics seminar, University Wisconsin Madison, February 2010.

Inverse Problems seminar, University of Washington, August 2009.

Applied Mathematics Seminar, Université de Toulouse, June 2009.

Applied Mathematics Kolloquium, ETH, Zürich, May 2009.

Applied Mathematics Seminar, Duke University, March 2009.

Probability Seminar, Columbia University, February 2009.

Probability Seminar, Brown University, February 2009.

Applied Mathematics Seminar, University of Utah, Salt Lake, December 2008.

Analysis Seminar, Courant Institute, NYU, October 2008.

NASA/GISS Colloquium, New York, April 2008.

Physics Colloquium, Queens College, New York, September 2007.

Laboratoire Jacques-Louis Lions seminar, Paris 6, Paris, June 2006.

CSCAMM Seminar, University of Maryland, January 2006.

Applied Mathematics Colloquium, University of Pennsylvania, November 2005.

Applied Mathematics Colloquium, UMBC, Baltimore, October 2005.

Applied Mathematics Colloquium, NJIT, Newark, September 2005.

Analysis seminar, Courant Institute, NYU, May 2005.

Radiology seminar, University of Utah, May 2005.

Analysis seminar, Rochester University, April 2005.

Analysis seminar, University of Pennsylvania, March 2005.

Applied mathematics and analysis seminar, Duke University, November 2004.

Inverse Problems Seminar, University of Washington, October 2004.

Differential geometry/PDE seminar, University of Washington, August 2004.

Applied Math Lab Seminar, Courant Institute (NYU), New York, April 2004.

Applied Mathematics Seminar, Chicago University, February 2004.

Medical Imaging Seminar, University College London, London, January 2004.

Applied Mathematics Seminar, University of California, Irvine, November 2003.

Inverse Problems Seminar, University of Washington, November 2003.

Applied Mathematics Seminar, University of California, Los Angeles, November 2003.

Laboratoire Jacques-Louis Lions seminar, Paris 6, Paris, December 2002.

Time-frequency Seminar, Princeton University, Princeton, April 2002.

Statistics Seminar, Columbia University, New York, April 2002.

CRSC Seminar, North Carolina State University, Rayleigh, February 2002.

Applied Mathematics Seminar, Courant Institute (NYU), New York, February 2002.

Applied Mathematics Seminar, Ecole Polytechnique, France, March 2001.

Applied Mathematics Seminar, University of California, Irvine, February 2001.

Applied Mathematics Seminar, University of California, Los Angeles, February 2001.

Applied Mathematics Seminar, Columbia University, February 2001.

Applied Mathematics Seminar, New Jersey Institute of Technology, January 2001.

Applied Mathematics Seminar, University of Wisconsin-Madison, October 2000.

Applied Mathematics Seminar, Chicago University, June 2000.

Applied Mathematics Seminar, University of Minnesota, April 1999.

Applied Mathematics Seminar, University of Chicago, April 1999.

Working group on Numerical Methods, Paris VI, France, November 1998.

Applied Mathematics Seminar, Brown University, April 1998.

Workshops and Conferences

PASI Summer School on Inverse Problems and PDE control, January 2012, Santiago, Chile (minicourse lecturer and invited presentation)

AMS Annual Meeting, January 2012, Boston (invited presentations)

Workshop "Multiscale Systems: Theory and Application", University of Warwick, Warwick, UK, December 2011 (invited presentation)

Workshop on Multiple Scattering in Correlated Disordered Media, Institut Henri Poincaré, Paris, December 2011 (invited presentation)

SIAM PDE conference, San Diego, CA, November 2011 (invited presentation)

Workshop on Inverse Problems, Ecole Polytechnique, France, September 2011 (invited presentation)

Mathematics of Medical Imaging ICRM, Edinburgh, Scotland, September 2011 (invited presentation)

Medical Imaging Workshop, Cambridge, UK, August 2011 (invited presentation)

Medical Imaging Summer School Jiao Tong University, Shanghai, China, August 2011 (minicourse lecturer)

RTG Summer School at University Washington, Seattle, WA, June 2011-July 2011 (minicourse lecturer)

Mathematics of Medical Imaging Conference, June 2011, Toronto, CA (invited presentation)

Applied Inverse Problems Conference 2011, May 2011, College Station, TX (Calderón Prize Lecture and two invited presentations)

Workshop on Computational Wave Equations, MSU, April 2011, East-Lansing, MI (invited presentation)

BIRS Workshop on Uncertainty Quantification, March 2011, Banff, Canada (co-organizer)

SIAM Geoscience Meeting, March 2011, Long Beach, CA (invited presentation)

Conference in honor of Naoufel Ben Abdallah, March 2011, Toulouse, France (invited presentation)

IPAM Workshop Homogenization and Beyond, January 2011, Los Angeles (co-organizer)

AMS Annual Meeting, January 2011, New Orleans (invited presentation)

MSRI Workshop on Inverse Problems, November 2010, Berkeley (invited presentation)

CMS summer meeting, June 2010, Fredericton, Canada (invited presentation)

Workshop stochastics and dynamics, May 2010, College Park, Maryland (invited presentation)

Inverse Transport Theory workshop, May 2010, Banff, Canada (co-organizer)

Workshop on Tomography, April 2010, Oberwolfach, Germany (invited presentation)

IPAM Workshop Biomedical Imaging, February 2010, Los Angeles

AMS Annual Meeting 2010, San Francisco (minisymposium Inverse Problems)

SIAM PDE 2009, Miami, Florida -December 2009 (organizer of minisymposium on equations with random coefficients)

DOE UITI Meeting, Clearwater, Florida -December 2009 (invited presentation)

BIRS Workshop on New modalities in Medical Imaging, Banff, Canada -November 2009 (invited presentation)

Workshop on Stochastic Multiscale Methods USC, Los Angeles, CA -August 2009 (invited presentation)

Applied Inverse Problems 2009, Vienna, Austria -August 2009 (organizer on session on medical imaging)

CEA-EDF-INRIA Summer School on Transport Theory, Paris, France -July 2009 (5 lectures)

AMS - MRC Summer School on Inverse Problems, Snowbird, Utah -June 2009 (co-organizer)

ANS 2009, Saratoga Springs, NY -May 2009 (invited presentation)

APAM workshop on Kinetic equations, Los Angeles, CA -April 2009 (invited presentation)

DOE UITI Meeting, Park City, Utah -December 2008 (invited presentation)

BIRS Workshop on Inverse Problems, Banff, Canada -November 2008 (invited presentation)

Conference on Biomathematical Imaging and IMRT, Huangguoshu, China -October 2008 (plenary lecture)

Workshop on Inverse Problems and Financial Mathematics, Linz, Austria -October 2008 (invited presentation)

SES Annual Meeting, University of Illinois Urbana-Champaign -October 2008 (invited presentation)

AFOSR-DARPA Meeting on Imaging Dayton, Ohio -August 2008 (invited presentation)

SIAM Life Sciences, Montreal -August 2008 (invited presentation)

SIAM Imaging Conference, San Diego -July 2008 (invited presentation)

SIAM Annual Meeting, San Diego -July 2008 (invited presentation)

Workshop on Inverse Transport, University of California Merced -June 2008 (invited presentation)

French-Canadian Annual Meeting, Montreal, CA -June 2008 (invited presentation)

Summer School on Inverse Problems, Colodaro State University, Fort Collins, CO -August 2007 (three lecture)

Applied Inverse Problems 2007, Vancouver, CA -June 2007 (plenary speaker)

FRG-Workshop in inverse problems, University of Washington, Seattle -June 2007 (two invited presentations)

Inverse Problems and micro-local analysis workshop, Luminy, France -March 2007 (invited presentation)

Workhop on High frequency waves, Vienna, Austria -February 2007 (invited presentation)

BIRS workshop on Inverse Problems, Banff, Canada - August 2006 (invited presentation)

Workshop on kinetic equations, Vienna, Austria -July 2006 (invited presentation)

Domain Decomposition 17, Stroebl, Austria - July 2006 (invited presentation)

CEMRACS 2006, Co-organizer Summer School on propagation of uncertainty, Luminy, France - July-August 2006

IPAM IP reunion, Lake Arrowhead, CA - June 06 (invited presentation)

PIERS 2006, Cambridge, MA - March 2006 (three invited presentations).

AMS Meeting, San Antonio, TX - January 2006 (invited presentation).

High Frequency Wave Propagation, CSCAMM, University of Maryland - September 2005 (invited lecture).

Workshop on Radiative Transfer organized by C.Bardos and J. Garnier, Luminy, France -

September 2005 (2 lectures on transport equations).

Workshop on Inverse Problems organized by G. Uhlmann, University of Washington, Seattle, WA - August 2005 (3 lectures on inverse transport).

Applied Inverse Problems 2005, Cirencester, UK - June 2005 (invited presentation).

SIAM Geosciences 2005, Avignon, France -June 2005 (invited presentation).

16th International Conference on Domain Decomposition Methods, New York, NY - January 2005 (invited presentation).

AMS Meeting, Atlanta, GA - January 2005 (invited presentation).

Computational Methods in Transport Workshop, Lake Tahoe, CA - September 2004 (plenary lecture).

American Institute of Mathematical Sciences fifth International Conference, Pomona, CA - June 2004 (organizer of session on "Wave Propagation and Inverse Problems").

Opening conference for Inverse Problems center at RPI, Troy, NY - April 2004 (organizer of session on "Time Reversal").

Inverse Problems, IPAM Workshop at Lake Arrowhead, California, USA - December 2003 (invited presentation).

15th International Conference on Domain Decomposition Methods, Berlin, Germany - July 2003 (invited presentation).

Workshop on Multiscale problems, Princeton University, New Jersey, USA - June 2003 (invited presentation).

Applied Inverse Problems: Theoretical and Computational Aspects, IPAM Workshop at Lake Arrowhead, California, USA - May 2003 (two invited presentations).

Mathematics in Biology and Medicine, CNRS conference, Paris, France - May 2003 (plenary lecture).

Scattering and Inverse Scattering, Banff International Research Center, Banff, Canada - March 2003 (plenary lecture).

Geometrically Based Motions, IPAM Workshop at Lake Arrowhead, California, USA - September 2002 (invited presentation).

Mathematical Geophysics Summer School (MGSS), Stanford University, California, USA (Several Lectures on Transport Equations in Geophysics and Time Reversal of Waves) - August 1998, 1999, 2000, 2001 & 2002.

PIERS 2002, Boston, Massachusetts, USA - July 2002 (invited presentation)

SIAM Annual Meeting, Philadelphia, Pennsylvania, USA - July 2002 (invited presentation).

MSRI Workshop on Inverse Problems, Berkeley, California, USA - November 2001 (invited presentation).

Geometrically Based Motions, IPAM culminating Workshop at Lake Arrowhead, California, USA - June 2001 (invited presentation).

Western section meeting of the American Mathematical Society, Waves in heterogeneous media special session, Las Vegas, Nevada, USA - April 2001 (invited presentation).

5th international conference on mathematical and numerical aspects of wave propagation, Santiago de Compostela, Spain - July 2000 (invited presentation).

ASCI Level 2 Reviews, Sandia National Labs, Albuquerque, New Mexico, USA (Reviewer for the University of Chicago) - May, 2000.

52nd Annual Meeting, American Physical Society, Fluid Dynamics from 1500 to 1999, New Orleans, Louisiana, USA (Oral Communication) - November, 1999.

16th International Conference on Transport Theory, Atlanta, Georgia, USA (Oral Communication) - May, 1999.

Fifth SIAM Conference on Mathematical and Computational Issues in the Geosciences, San Antonio, Texas, USA (Oral Communication) - March, 1999.

Mathematical and Numerical Aspects of Wave propagation, SIAM Meeting, Golden, CO, USA - June, 1998.

Winter School on Diffuse Waves in Complex Media, NATO ASI, Centre de Physique des Houches, France - March, 1998.

10th International Conference on Domain Decomposition Methods, University of Colorado at Boulder, USA (Oral communication) - August, 1997.

15th International Conference on Transport Theory, Chalmers University of Technology, Göteborg, Sweden (Oral communication) - June, 1997.

Workshop on recent approximation theory results in the numerical solution of differential and integral equations, Palazzone, Cortona, Italy (Oral Communication) - September, 1995.

List of Publications

[0] G. Bal. *Couplage d'équations et homogénéisation en transport neutronique. Thèse de Doctorat* de l'Université Paris 6 (in French), 1997.

[1] G. Allaire and G. Bal. Homogénéisation d'une équation spectrale de transport neutronique (homogenization of a spectral equation in neutron transport). *C. R. Acad. Sci. Paris, t.325, Série I*, pp. 1043–1048, 1997.

[2] G. Bal and X. Warin. Discrete Ordinates Methods in xy-Geometry with spatially varying angular discretization. *Nuclear Science and Engineering*, **127**(2), pp. 169–181, 1997.

[3] G. Bal, A. Fannjiang, G. Papanicolaou, and L. Ryzhik. Radiative transport in a periodic structure. *J. Statist. Phys.*, **95**, pp. 479–494, 1999.

[4] G. Bal, J.B. Keller, G. Papanicolaou, and L. Ryzhik. Transport theory for waves with reflection and transmission at interfaces. *Wave Motion*, **30**, pp. 303–327, 1999.

[5] G. Bal. First-order Corrector for the Homogenization of the Criticality Eigenvalue Problem in the Even Parity Formulation of the Neutron Transport. *SIAM J. Math. Anal.*, **30**, pp. 1208–1240, 1999.

[6] G. Bal, G. Papanicolaou, and L. Ryzhik. Diffusive scattering from weakly random surfaces. *J. Math. Phys.*, **40**, pp. 4813–4827, 1999.

[7] G. Allaire and G. Bal. Homogenization of the criticality spectral equation in neutron transport. *M2AN Math. Model. Numer. Anal.*, **33**(4), pp.721–746, 1999.

[8] G. Bal. Boundary Layer Analysis in the Homogenization of Neutron Transport Equations in a Cubic Domain. *Asymptot. Anal.*, **20**(3-4), pp.213–239, 1999.

[9] G. Bal, G. Papanicolaou, and L. Ryzhik. Probabilistic Theory of Transport Processes with Polarization. *SIAM J. App. Math.*, **60**(5), pp. 1639–1666, 2000.

[10] G. Bal and L. Ryzhik. Diffusion approximation of radiative transfer problems with interfaces. *SIAM J. App. Math.*, **60**(6), pp. 1887–1912, 2000.

[11] G. Bal and M. Moscoso. Polarization Effects of Seismic Waves on the Basis of Radiative Transport Theory. *Geophys. J. Int.*, **142**, pp. 571–585, 2000.

[12] G. Bal, V. Freilikher, G. Papanicolaou, and L. Ryzhik. Wave transport along surfaces with random impedance. *Phys. Rev. B*, **62**(10), pp. 6228–6240, 2000.

[13] G. Bal. Inverse problems for homogeneous transport equations. Part I: One dimensional case. *Inverse Problems*, **16**, pp. 997–1011, 2000.

[14] G. Bal. Inverse problems for homogeneous transport equations. Part II: Multidimensional case. *Inverse Problems*, **16**, pp. 1013–1028, 2000.

[15] G. Bal. Spatially Varying Discrete Ordinates Methods in $XY-$Geometry. *Math. Models Meth. Appl. Sci.*, **10**(9), pp. 1277–1303, 2000.

[16] G. Bal and M. Moscoso. Radiative Transfer for Wave Propagation in Random Media. Monte Carlo Simulations of Seismic Waves. *Mathematical and numerical aspects of wave propagation (Santiago de Compostela, 2000)*, 559–563, SIAM, Philadelphia, PA, 2000.

[17] G. Bal and M. Moscoso. Theoretical and Numerical Analysis of Polarization for Time Dependent Radiative Transfer Equations. *Journal of Quantitative Spectroscopy and*

Radiative Transfer, **70**(1), pp. 75–90, 2001.

[18] G. Bal. Fourier analysis of the diamond discretization in particle transport. *Calcolo*, **38**(3), pp. 141–172, 2001.

[19] G. Bal. Diffusion Approximation of Radiative Transfer Equations in a Channel. *Transport Theory Statist. Phys.*, **30**(2-3), pp. 269–293, 2001.

[20] G. Bal. Homogenization of a Spectral Equation with Drift in Linear Transport. *ESAIM Contr. Op. Ca. Va.*, **6**(26), pp. 613–627, 2001.

[21] G. Bal and L. Ryzhik. Time Reversal for Classical Waves in Random Media. *C. R. Acad. Sci. Paris, Série I*, **333**, pp. 1041–1046, 2001.

[22] G. Bal and T. Chou. Capillary-gravity wave transport over spatially random drift. *Wave Motion*, **35**, pp. 107–124, 2002.

[23] G. Bal and L. Ryzhik. Wave transport for a scalar model of the Love waves. *Wave Motion*, **36**, pp. 49–66, 2002.

[24] G. Bal and Y. Maday. Coupling of transport and diffusion models in linear transport theory. *M2AN Math. Model. Numer. Anal.*, **36**(1), pp. 69–86, 2002.

[25] G. Bal. Transport through diffusive and non-diffusive regions, embedded objects, and clear layers. *SIAM J. Appl. Math.*, **62**(5), pp. 1677–1697, 2002.

[26] G. Bal and Y. Maday. A "parareal" time discretization for non-linear PDE's with application to the pricing of an American put, in Recent developments in domain decomposition methods (Zürich, 2001), L.F. Pavarino and A. Toselli, eds., Vol. 23 of Lecture Notes in Computational Science and Engineering, Springer Verlag, Berlin, pp. 189-202, 2002.

[27] G. Bal, G. Papanicolaou and L. Ryzhik. Radiative transport limit for the random Schrödinger equation. *Nonlinearity*, **15**, pp. 513-529, 2002.

[28] G. Bal. Particle transport through scattering regions with clear layers and inclusions. *J. Comp. Phys.*, **180**(2), pp. 659-685, 2002.

[29] G. Allaire, G. Bal and V. Siess. Homogenization and localization in locally periodic transport. *ESAIM Contr. Op. Ca. Va.*, **8**, pp. 1-20, 2002.

[30] G. Bal, G. Papanicolaou and L. Ryzhik. Self-averaging in time reversal for the parabolic wave equation. *Stoch. Dyn.*, **2**(4), pp. 507–532, 2002.

[31] G. Bal. Optical tomography of small volume absorbing inclusions. *Inverse Problems*, **19**(2), pp. 371-386, 2003.

[32] G. Bal and L. Ryzhik. Time Reversal and Refocusing in Random Media. *SIAM J. Appl. Math.*, **63**(5), pp. 1475-1498, 2003.

[33] G. Bal, T. Komorowski and L. Ryzhik. Self-averaging of Wigner transforms in random media. *Comm. Math. Phys.*, **242**(1-2), pp. 81-135, 2003.

[34] G. Bal and K. Ren. Generalized diffusion model in optical tomography with clear layers. *J. Opt. Soc. Amer. A*, **20**(12), pp. 2355-2364, 2003.

[35] G. Bal. On the attenuated Radon transform with full and partial measurements. *Inverse Problems*, **20**(2), pp. 399-419, 2004.

[36] K. Ren, G. S. Abdoulaev, G. Bal and A.H. Hielscher. Algorithm for solving the equation of radiative transfer in the frequency domain. *Optics Letter*, **29**(6), pp. 578-580, 2004.

[37] G. Bal. On the self-averaging of wave energy in random media. *Multiscale Model. Simul.*, **2**(3), pp. 398-420, 2004.

[38] G. Bal and T. Chou. On the reconstruction of diffusions using a single first-exit time distribution. *Inverse Problems*, **20**(4), pp. 1053-1066, 2004.

[39] G. Bal and P. Moireau. Fast numerical inversion of the attenuated Radon transform with full and partial measurements. *Inverse Problems*, **20**(4), pp. 1137-1164, 2004.

[40] G. Bal and R. Verástegui. Time Reversal in Changing Environment. *Multiscale Model. Simul.*, **2**(4), pp. 639-661, 2004.

[41] G. Bal and L. Ryzhik. Time splitting for the Liouville equation in a random medium. *Comm. Math. Sci.*, **2**(3), pp. 515-534, 2004.

[42] G. Bal. On the Convergence and the Stability of the Parareal Algorithm to solve Partial Differential Equations, in Domain Decomposition Methods in Science and Engineering, R. Kornhuber, R. Hoppe, J. Périaux, O. Pironneau, O. Widlund, J. Xu, eds., Vol. 40 of Lecture Notes in Computational Science and Engineering, Springer Verlag, Berlin, pp. 425-432, 2004.

[43] G. Bal and L. Ryzhik. Time splitting for wave equations in random media. *M2AN Math. Model. Numer. Anal.*, **38**(6), pp. 961-988, 2004.

[44] G. Bal. Reconstructions in impedance and optical tomography with singular interfaces. *Inverse Problems*, **21**(1), pp. 113-132, 2005.

[45] G. Bal and K. Ren. Atmospheric concentration profile reconstructions from Radiation measurements. *Inverse Problems*, **21**(1), pp. 153-168, 2005.

[46] G. Bal and L. Ryzhik. Stability of time reversed waves in changing media. *Disc. Cont. Dyn. Syst. A*, **12**(5), pp. 793-815, 2005.

[47] G. Bal. Ray transforms in hyperbolic geometry. *J. Math. Pures Appl.*, **84**(10), pp. 1362-1392, 2005.

[48] G. Bal and O. Pinaud. Time Reversal Based Detection in Random Media. *Inverse Problems*, **21**(5), pp. 1593-1620, 2005.

[49] G. Bal. Kinetics of scalar wave fields in random media. *Wave Motion*, **43**, pp. 132-157, 2005.

[50] G. Bal. Transport approximations in partially diffusive media. *Lecture Notes in Computational Science and Engineering; Ed. F. Graziani, Proceedings of the Computational Methods in Transport Workshop, Lake Tahoe, September 2004*, **48**, pp. 373-400, 2006.

[51] G. Bal and K. Ren. Reconstruction of singular surfaces by shape sensitivity analysis and level set method. *Math. Models Meth. Appl. Sci.*, **16**(8), pp. 1347-1373, 2006.

[52] G. Bal. Radiative transfer equations with varying refractive index: a mathematical perspective. *J. Opt. Soc. Am. A*, **23**(7), pp. 1639-1644, 2006.

[53] G. Bal and L. Ryzhik. Wave field correlations in weakly mismatched random media. *Stochastics & Dynamics*, **6**(3), pp. 301-328, 2006.

[54] G. Bal and O. Pinaud. Accuracy of transport models for waves in random media. *Wave Motion*, **43**(7), pp. 561-578, 2006.

[55] K. Ren, G. Bal and A. H. Hielscher. Frequency Domain Optical Tomography Based on the Equation of Radiative Transfer. *SIAM J. Sci. Comput.*, **28**(4), pp. 1463-1489, 2006.

[56] D. Liu, S. Vasudevan, J. Krolik, G. Bal and L. Carin. Electromagnetic Time-Reversal Imaging in Changing Media: Experiment and Analysis. *IEEE Transactions on Antennas and Propagation*, **55**(2), pp. 344-354, 2007.

[57] G. Bal and A. Tamasan. Inverse source problems in transport equations. *SIAM J. Math. Anal.*, **39**(1), pp. 57-76, 2007.

[58] G. Bal. Homogenization in random media and effective medium theory for high frequency waves. *Disc. Cont. Dyn. Syst. B*, **8**(2), pp. 473-492, 2007.

[59] G. Bal and O. Pinaud. Kinetic models for imaging in random media. *Multiscale Model. Simul.*, **6**(3), pp. 792-819, 2007.

[60] K. Ren, G. Bal and A. H. Hielscher. Transport- and diffusion-based optical tomography in small domains: A comparative study. *Applied Optics*, **46**(27), pp. 6669-6679, 2007.

[61] G. Bal, L. Carin, D. Liu, and K. Ren. Experimental validation of a transport-based imaging method in highly scattering environments. *Inverse Problems*, **23**(6), pp. 2527-2539, 2007.

[62] G. Bal and O. Pinaud. Self-averaging of kinetic models for waves in random media. *Kinetic Related Models*, **1**(1), pp. 85-100, 2008.

[63] G. Bal and Q. Wu. Symplectic parareal. *Domain decomposition methods in science and engineering XVII*, Lect. Notes Comput. Sci. Eng., **60**, pp. 401-408, 2008.

[64] G. Bal, I. Langmore and F. Monard. Inverse transport with isotropic sources and angularly averaged measurements. *Inverse Probl. Imaging*, **2**(1), pp. 23-42, 2008.

[65] G. Bal. Parallelization in time of (stochastic) ordinary differential equations. `www.columbia.edu/∼gb2030/PAPERS/paralleltime.pdf`.

[66] G. Bal and K. Ren. Transport-based imaging in random media. *SIAM J. Appl. Math.*, **68**(6), pp. 1738-1762, 2008.

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