

# Guillaume Bal

Department of Applied Physics & Applied Mathematics  
Columbia University  
New York, NY 10027  
(212) 854 4731 (office)  
(212) 854 8257 (fax)  
gb2030@columbia.edu  
<http://www.columbia.edu/~gb2030>

## Education

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

## Professional Experience

- Professor, Columbia University, 2009-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

Applied Partial Differential Equations. Equations with random coefficients including wave and particle propagation in heterogeneous media. Mathematical and numerical analysis of Inverse Problems. Applications in medical imaging and geophysical imaging.

## Awards and Grants

DOE Grant DE-FG52-08NA28779 “Monte Carlo and Deterministic 3D radiative transfer” (co-PI Anthony Davis, LANL) Oct 2008 - Oct 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.

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.

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.

The Jean-Pierre Lepetit Prize 1998, awarded for the best PhD thesis defended in 1997-1998 at the Direction des Etudes et Recherches d'Electricité de France (EDF), France.

### **Professional activities**

AMS, member.

Associate Editor: Discrete and Continuous Dynamical Systems (DCDS-B) 2006-

Associate Editor: Kinetic & Related Models (KRM) 2007-

Associate Editor: Inverse Problems and Imaging (IPI) 2009-

Advisory Panel: Inverse Problems (IP) 2008-

### **Teaching and Mentoring Experience**

Columbia University (2001-present): teaching of undergraduate courses in PDE's; teaching of graduate courses in numerical analysis, inverse problems, 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.

Ramón Verástegui, Graduated in Dec. 2005.

Nick Hoell.

Wenjia Jing.

François Monard.

Will Martin.

Vincent Jugnon (Ecole Polytechnique, with Habib Ammari).

### **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 Polytechnique (Spring 2009).

### **Postdoctoral researchers:**

Olivier Pinaud (Fall 2003- Fall 2005).

Kui Ren (Fall 2005 - Summer 2007).

Alexandre Jollivet (Fall 2007 - ).

Ian Langmore (Fall 2008 - ).

### **Seminars**

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, Raleigh, 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

- 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)
- Workshop 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*, Stroebel, 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 - Mai 2003 (two invited presentations).

*Mathematics in Biology and Medicine*, CNRS conference, Paris, France - Mai 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/parallelttime.pdf](http://www.columbia.edu/~gb2030/PAPERS/parallelttime.pdf).
- [66] G. Bal and K. Ren. Transport-based imaging in random media. *SIAM J. Appl. Math.*, **68**(6), pp. 1738-1762, 2008.
- [67] G. Bal, J. Garnier, S. Motsch, and V. Perrier. Random integrals and correctors in homogenization. *Asymptot. Anal.*, **59**(1-2), pp. 1-26, 2008.
- [68] G. Bal. Central limits and homogenization in random media. *Multiscale Model. Simul.*, **7**(2), pp. 677-702, 2008.
- [69] G. Bal. Inverse transport from angularly averaged measurements and time harmonic isotropic sources. *Mathematical Methods in Biomedical Imaging and Intensity-Modulated Radiation Therapy*, Eds. Y. Censor, M. Jiang, A.K. Louis, CRM Series, Scuola Normale Superiore Pisa, Italy, pp. 19-35, 2008.
- [70] G. Bal. Inverse Problems in random media: a kinetic approach. *J. Phys. Conf. Series*, **124**, 012001, 2008.
- [71] G. Bal and A. Jollivet. Stability estimates in stationary inverse transport. *Inverse Probl. Imaging*, **2**(4), pp. 427-454, 2008.
- [72] G. Bal and K. Ren. Physics-based models for measurement correlations. Application to an inverse Sturm-Liouville problem. *Inverse Problems*, **25**, 055006, 2009.
- [73] G. Bal. Inverse transport theory and applications. *Inverse Problems*, **25**, 053001, 2009.
- [74] G. Bal and A. Jollivet. Approximate stability in inverse transport. *To appear in the proceedings of the Huangguoshu International Conference on Medical Imaging*, 2009.
- [75] G. Bal and O. Pinaud. Small volume expansions for elliptic equations. *Submitted*.

- [76] G. Bal and A. Jollivet. Stability for time dependent inverse transport. *Submitted*.
- [77] G. Bal. Homogenization with large spatial random potential. *Submitted*.
- [78] G. Bal. Convergence to SPDEs in Stratonovich form. *To appear in Comm. Math. Phys.*, 2009.
- [79] G. Bal and A. Jollivet. Time-dependent angularly averaged inverse transport. *To appear in Inverse Problems*, 2009.
- [80] G. Bal and O. Pinaud. Dynamics of wave scintillation in random media. *Submitted*.