

Simon L. Cotter

CONTACT INFORMATION

Mathematical Institute
The University of Oxford
Oxford
OX1 3LB

Email: cotter@maths.ox.ac.uk
WWW: www.mathematicians.org.uk/slc/

RESEARCH INTERESTS

- Monte Carlo Markov chain (MCMC) methods on function spaces
- Infinite dimensional inverse problems
- Bayesian shape registration (medical image processing)
- Bayesian inversion in fluid dynamics
- Bayesian inversion for gene regulatory networks
- Stochastic multiscale modelling of biochemical reactions
- Stochastic modelling of fetal-placental vascularisation

ACADEMIC POSITIONS

Junior Research Fellowship, St. Cross College Oxford, October 2011-September 2014

Postdoctoral Research Assistant, OCCAM, Mathematical Institute, University of Oxford, April 2010-present

- Project title: Chemical Fokker-Planck equation and multiscale modelling of (bio)chemical systems

EDUCATION

PhD, Mathematics, University of Warwick, 2010

- Thesis Topic: Applications of MCMC Methods on Function Spaces
- Supervisor: Andrew M. Stuart
- Areas of Study:
 - Data assimilation for Eulerian and Lagrangian data in Stokes' flow.
 - Shape registration problem in data assimilation.

MMath, University of Warwick

- 1st Class Hons, June 2006.

WORK EXPERIENCE (NON-ACADEMIC)

BTEexact: Summer Placement Student, Martlesham Research and Development Laboratories, 2003-2005.

PUBLICATIONS

[1] S. L. Cotter, K. C. Zygalakis, I. G. Kevrekidis, and R. Erban, *A Constrained Approach to Multiscale Stochastic Simulation of Chemically Reacting Systems*, Journal of Chemical Physics 135, 094102 (2011)

- [2] S. L. Cotter, M. Dashti, and A. M. Stuart, *Variational Data Assimilation Using Targetted Random Walks*, International Journal for Numerical Methods in Fluids (to appear)
- [3] S. L. Cotter, M. Dashti, and A. M. Stuart, *Approximation of Bayesian Inverse Problems for PDEs*, SIAM Journal of Numerical Analysis 48, 322-345 (2010)
- [4] S. L. Cotter, M. Dashti, J. C. Robinson and A. M. Stuart, *Bayesian Inverse Problems for Functions and Applications to Fluid Mechanics*, Inverse Problems 25 115008 (2009)
- [5] L. Humphrey, A. Wallace and S. L. Cotter, *Performance of Various ADSL CPE in Presence of 100 Hz Repetitive Impulse Noise* ITU-T SG15/Q4 LC-031, Lake Tahoe August 2004.

IN PREPARATION

- [6] S. L. Cotter, Tomáš Vejchodský and Radek Erban, *Adaptive Finite Element Method Assisted by Stochastic Simulation of Chemical Systems*, to be submitted to SIAM Journal on Scientific Computing.
- [7] S. L. Cotter, G. O. Roberts, A. M. Stuart, and D. White, *MCMC Methods for Functions: Modifying Old Algorithms to Make Them Faster*, to be submitted to Statistical Science.
- [8] C. J. Cotter and S. L. Cotter, *A Data Assimilation Problem in Shape Registration*, to be submitted to Inverse Problems.
- [9] A.E.P. Heazelle, S. Collins, S. Cotter, L.S. Gallimore, T. Junaid, V. Klika, M.V. Kritz, K. Preedy, I. Pu, A. Setchi, J.H. Siggers, G. Stevenson, R.J. Whittaker, *Clinically Significant Quantitative Measures of Placental Size and Shape, Cord Insertion Point, and Fetal-Placental Vascularisation*, to be submitted.
- [10] S. Cotter, V. Klika, A.E.P. Heazelle, S. Collins, L.S. Gallimore, T. Junaid, V. Klika, M.V. Kritz, K. Preedy, I. Pu, A. Setchi, J.H. Siggers, G. Stevenson, R.J. Whittaker, *A Stochastic Model for Early Fetal-Placental Vascularisation*, to be submitted.

AWARDS

- Peter Carpenter Memorial Graduate Student Travel Fund - £500 awarded towards cost of attending conference in Barcelona in June 2010.

SELECTED TALKS

- November 2011, OCCAM group meeting, Oxford.
- October 2011, Math finance seminar, Oxford.
- October 2011, CMB-OCCAM seminar, Oxford.
- June 2011, ECMTB '11, Krakow
- January 2011, CMB seminar, Oxford.
- December 2010, OCIAM seminar, Oxford.
- November 2010, OCCAM group meeting, Oxford.

- June 2010, DSPDEs '10, Barcelona.
- January 2010, Applied Maths Seminar, Aston.
- December 2009, Applied Maths Seminar, Warwick.
- December 2009, Reading-Warwick Data Assimilation Day, Reading.
- July 2009, EPSRC Symposium Capstone Conference, Warwick.
- June 2009, SIAM: Computational and Mathematical Issues in the Geosciences, Leipzig Germany.
- April 2009, BAMC, Nottingham University.
- March 2009, EPSRC Symposium Workshop on MCMC, Warwick University.
- December 2008, Junior Data Assimilation Researcher's Day, Reading University.
- April 2008, BAMC, Manchester University.
- March 2008, Applied Mathematics and Statistics Seminar, Warwick University.

SESSIONS CHAIRED
AND ORGANISED

- *Multiscale modelling of reaction kinetics in biology*, ECMTB '11, Krakow, June 2011.

WORKSHOPS
ORGANISED

- *Mathematics-in-Medicine Study Group '10 follow up meeting: Placental Growth Modelling*, Oxford, May 2011.

TEACHING
EXPERIENCE

Class Tutor, Mathematical Institute, University of Oxford

- 2010, 2011 Autumn: Banach Spaces

Lecturer, Fundamental Tools for MSc in Financial Maths, Mathematics Institute, University of Warwick

- 2007, 2008 Autumn: (Course Organiser '08-'09) 5 hours lecturing over 1 week to class of approx. 50 students, exam writing and marking.

Teaching Assistant, Mathematics Institute, University of Warwick

- 2008-2009 Autumn: Fundamental Tools for MSc in Financial Maths; Spring: Numerical Analysis and Partial Differential Equations.
- 2007-2008 Autumn: Fundamental Tools for MSc in Financial Maths; Spring: Maths by Computer, Numerical Analysis.
- 2006-2007 Autumn: Matrix Analysis and Algorithms; Spring: Maths by Computer, Numerical Analysis.

Undergraduate Supervisor, Mathematics Institute, University of Warwick

- 2006-2008 Supervisor of first and second year undergraduate students in groups of four.

POSTGRADUATE
SUPERVISION

MSc Supervisor, Mathematical Institute, University of Oxford

- Matthew Phinney, MSc in Mathematical Modelling and Scientific Computing, 2011. Distinction. Co-supervised with Radek Erban.

PASTORAL CARE

College Advisor, St Cross College, University of Oxford

- College advisor for 4 DPhil students and 2 MSc students for academic year 2011-2012.

REFEREES

Prof. Andrew Stuart, Mathematics Institute, University of Warwick, Coventry, CV4 7AL, UK.

Dr. Radek Erban, Mathematical Institute, University of Oxford, Oxford, OX1 3LB

Prof. Gareth Roberts, Department of Statistics, University of Warwick, Coventry, CV4 7AL, UK.