Curriculum Vitae

Benjamin James Stevens Adcock

CONTACT INFORMATION

Department of Mathematics
Simon Fraser University
8888 University Drive
Burnaby, BC V5A 1S6
Canada

Phone: 1-778-782-3760
E-mail: ben_adcock@sfu.ca
Website: http://www.damtp.cam.ac.uk/user/na/people/BenA

NATIONALITIES

Canadian and British (dual citizenship)

EMPLOYMENT

Simon Fraser University, Burnaby, BC, Canada **Sept 2010 to Aug 2012**

NSERC Postdoctoral Fellow in Mathematics
PIMS Postdoctoral Fellow in Mathematics
Advisor: Professor Nilima Nigam

University of Cambridge, Cambridge, UK **Feb 2010 to Aug 2010**

PhD Plus Research Fellow

RESEARCH INTERESTS

Numerical analysis, applied and computational harmonic analysis, approximation theory, spectral methods for PDEs, resolution of the Gibbs phenomenon, sampling theory, nonuniform sampling, compressed sensing

EDUCATION

University of Cambridge, Cambridge, UK

PhD in Mathematics, supervised by Professor Arieh Iserles **Oct 2006 to Feb 2010**
Thesis title: *Modified Fourier expansions: theory, construction and applications.*

Certificate of Advanced Studies in Mathematics **Oct 2005 to Jun 2006**
Awarded a pass with high Distinction.

B.A. (Hons) in Pure and Applied Mathematics, Trinity Hall **Oct 2002 to Jun 2005**
First class in Parts IA, IB and II of the Mathematical Tripos.

AWARDS

NSERC Postdoctoral Fellowship
- Two years full support. Held September 2010–

Pacific Institute for the Mathematical Sciences Postdoctoral Fellowship
- Two years full support. Held September 2010–

EPSRC PhD Plus Research Fellowship
- One of only two six-month fellowships awarded. Held February–August 2010.

EPSRC Postgraduate Scholarship
- Three years full support. Held October 2006–August 2009.

PRIZES

Leslie Fox Prize in Numerical Analysis
- Awarded a second prize (2011).

DAMTP
- Awarded a Smith–Knight essay prize (2008).

Trinity Hall

- Awarded the Parks Prize in Mathematics (2006).
- Awarded the Wylie Prize in Mathematics (2005).
- Elected as a Bateman Scholar (2005).

REVIEWED JOURNAL PUBLICATIONS

B. Adcock & A. C. Hansen (2012), *Stable reconstructions in Hilbert spaces and the resolution of the Gibbs phenomenon*, Appl. Comput. Harmon. Anal. (to appear).

B. Adcock & A. C. Hansen (2012), *A generalized sampling theorem for stable reconstructions in arbitrary bases*, J. Fourier Anal. Appl. (to appear).

B. Adcock, A. Iserles & S. P. Nørsett (2012), *From high oscillation to rapid approximation II: Expansions in Birkhoff series*, IMA J. Num. Anal. 32(1):105–140.

B. Adcock (2011), *On the convergence of expansions in polyharmonic eigenfunctions*, J. Approx. Theory 163(11):1638–1674.

B. Adcock (2011), *Gibbs phenomenon and its removal for a class of orthogonal expansions*, BIT 51(1): 7-41.

B. Adcock (2011), *Convergence acceleration of modified Fourier series in one or more dimensions*, Math. Comp. 80(273): 225–261.

B. Adcock (2010), *Multivariate modified Fourier series and application to boundary value problems*, Numer. Math. 115(4): 511-552.

B. Adcock (2009), *Univariate modified Fourier methods for second order boundary value problems*, BIT 49(2): 249-280.

SUBMITTED FOR PUBLICATION

B. Adcock & A. C. Hansen (2011), *Generalized sampling and infinite-dimensional compressed sensing*, submitted to Comm. Pure Appl. Math.

B. Adcock, A. C. Hansen, E. Herrholz & G. Teschke (2011), *Generalized sampling, infinite-dimensional compressed sensing, and semi-random sampling for asymptotically incoherent dictionaries*, submitted to IEEE Trans. Signal Process.

B. Adcock, A. C. Hansen, E. Herrholz & G. Teschke (2011), *Generalized sampling: extension to frames and ill-posed problems*, submitted to Inverse Problems.

B. Adcock & A. C. Hansen (2011), *Generalised sampling and the stable and accurate reconstruction of piecewise analytic functions from their Fourier coefficients*, submitted to Math Comp.

B. Adcock & A. C. Hansen (2011), *Sharp bounds, optimality and a geometric interpretation for generalised sampling in Hilbert spaces*, submitted to SIAM J. Math. Anal.

B. Adcock & D. Huybrechs (2011), *On the resolution power of Fourier extensions for oscillatory functions*, submitted to J. Comput. Phys.

PROCEEDINGS

B. Adcock & D. Huybrechs (2011), *Accuracy of the Fourier extension method for oscillatory phenomena.* Proceedings of the 10th International Conference on Mathematical and Numerical Aspects of Waves, Vancouver, Canada, July 2011.

B. Adcock & A. C. Hansen (2011), *Generalized sampling and infinite-dimensional compressed sensing.* Proceedings of the 4th Workshop on Signal Processing with Adaptive Sparse Structured Representations,

Edinburgh, UK, June 2011.

B. Adcock & A. C. Hansen (2011), *Reduced consistency sampling in Hilbert spaces.* Proceedings of the 9th International Conference on Sampling Theory and Applications, Singapore, May 2011.

B. Adcock & D. Huybrechs (2010), *Multivariate modified Fourier expansions.* Proceedings of the 8th International Conference on Spectral and High Order Methods, Trondheim, Norway, June 2009.

ESSAYS

B. Adcock (2010), *Modified Fourier expansions: theory, construction and applications*, PhD thesis.

B. Adcock (2008), *Birkhoff–Galerkin methods for linear boundary value problems*, Smith-Knight prize essay.

B. Adcock (2006), *Symplectic methods for Hamiltonian equations*, Part III Essay.

SEMINAR PRESENTATIONS

Generalized sampling and infinite-dimensional compressed sensing
- University of British Columbia SCAIM seminar, November 2011.

Generalized sampling: a new framework for image and signal reconstruction
- Mathematics Colloquium, Arizona State University, October 2011.

The computation of stable and accurate Fourier extensions of smooth functions
- ASU Computational and Applied Mathematics Seminar, Arizona State University, October 2011.

Stable reconstructions in Hilbert spaces and the resolution of the Gibbs phenomenon
- Leslie Fox Prize Meeting, MIMS, University of Manchester, June 2011.

Generalised sampling in Hilbert spaces
- EPFL BIG Seminar, EPFL, Lausanne, June 2011.

A general framework for numerically stable reconstructions in Hilbert spaces
- DAMTP Numerical Analysis Seminar, University of Cambridge, March 2011.

A general framework for numerically stable reconstructions in Hilbert spaces
- Bath Numerical Analysis Seminar, University of Bath, March 2011.

Generalized sampling in Hilbert spaces, with application to spectral methods for nonsmooth problems
- University of British Columbia SCAIM seminar, November 2010.

A stable framework for sampling in Hilbert spaces, with applications to Fourier and polynomial-based spectral methods
- Simon Fraser University CSC seminar, October 2010.

Modified Fourier series: from d-variate cubes to expansions in simplices
- Department of Computer Science Seminar, K. U. Leuven, May 2010.

Modified Fourier expansions: theory, accelerating convergence and generalisations
- Bath Numerical Analysis Seminar, University of Bath, April 2010.

Spectral-Galerkin methods based on eigenseries expansions
- Applied and Computational Analysis Graduate Seminar, University of Cambridge, 2008.

CONFERENCE PRESENTATIONS

Generalized sampling and infinite-dimensional compressed sensing
- Pacific Northwest Numerical Analysis Seminar, VIU, Canada, October 2011.

Accuracy of the Fourier extension method for oscillatory phenomena
- International Conference on Mathematical and Numerical Aspects of Waves, Vancouver, Canada, July 2011.

Generalised sampling in Hilbert spaces
- International conference on Sampling Theory and its Applications, NTU, Singapore, May 2011.

A numerical framework for stable reconstructions in Hilbert spaces
- Oberwolfach Workshop on Geometric Numerical Integration, Oberwolfach, Germany, March 2011.

Stable sampling in Hilbert spaces
- Canadian Mathematical Society Winter Meeting, Vancouver, December 2010.

Accurate and stable recovery of functions from spectral data
- LMS - EPSRC Durham Symposium, Durham, United Kingdom, July 2010.

Generalising modified Fourier series: expansions in (sub)polyharmonic eigenfunctions
- BIT50 Trends in Numerical Computing, Lund, Sweden, June 2010.

Fourier-like expansions for spectral-Galerkin discretizations of non-periodic boundary value problems
- International Conference on Spectral and High Order Methods, Trondheim, Norway, June 2009.

Modified Fourier spectral-Galerkin methods for boundary value problems
- Foundations of Computational Mathematics, Hong Kong, June 2008.

Spectral methods and modified Fourier series
- International Conference on Scientific Computation and Differential Equations, St. Malo, France, July 2007.

Spectral methods and modified Fourier series
- Highly Oscillatory Problems: Computation, Theory and Application, Isaac Newton Institute for Mathematical Sciences, Cambridge, June 2007.

RESEARCH VISITS

Department of Mathematics and Statistics, Arizona State University, October 2011 (1 week)
- Host: Professor A. Gelb

Department of Mathematics, Michigan State University, August 2011 (1 week)
- Host: Professor Y. Wang

Biomedical Imaging Group, EPFL, June 2011 (4 days)
- Hosts: Professor M. Unser and Dr H. Kirschner

Department of Mathematical Sciences, University of Bath, March 2011 (3 days)
- Host: Dr E. Spence

Department of Computer Science, K.U. Leuven, May 2010 (1 week)
- Host: Professor D. Huybrechs

PROFESSIONAL EXPERIENCE

Member of the Scientific Committee for the 10^{th} International Conference on Mathematical and Numerical aspects of Waves (WAVES), Vancouver, Canada, July 25–29, 2011.

Reviewer for the following journals:
- BIT Numerical Mathematics

- Communications in Mathematical Analysis
- IMA Journal of Numerical Analysis
- Journal of Complexity
- SIAM Journal on Applied Mathematics

TEACHING EXPERIENCE

Birkbeck College, University of London, London, UK

Sessional Lecturer **Oct 2007 to Sept 2009**

Taught *Quantitative Techniques for Financial Engineering*, part of the Graduate Diploma in Financial Engineering. Subject: multivariable calculus and differential equations.

University of Cambridge, Cambridge, UK

Undergraduate Supervisor **Oct 2006 to Jun 2010**

Taught undergraduates in small groups (1–2 students). Courses taught:

- II(D) Linear Analysis – A first course in functional analysis.
- II(C) Topics in Analysis.
- IB Complex Analysis – A first course in the theory of functions of a complex variable.
- IB Linear Algebra – A second course in vector spaces and linear maps.
- IB Numerical Analysis – A first course.
- IIA Mathematics for Economists and Statisticians – A course in calculus and linear algebra.
- IA – various first year undergraduate courses, including analysis, group theory, differential equations and mathematical methods

Admissions Interviewer **Dec 2008 to June 2010**

Conducted interviews for Trinity Hall in both Mathematics and Economics.