Jared W. Tanner

University of Edinburgh
School of Mathematics
Email: Jared.Tanner@ed.ac.uk
Web: www.maths.ed.ac.uk/~tanner

Positions

Reader in Applied Mathematics, Univ. of Edinburgh, Mathematics, 07/09-current

Lecturer in Applied Mathematics, Univ. of Edinburgh, Mathematics, 07/07-06/09

Assistant Professor (Warnock endowed chair), Univ. of Utah, Mathematics, 07/06-current

NSF Mathematical Sciences Postdoctoral Fellow, Stanford Univ., Statistics, 06/04-07/06

Visiting Assistant Research Professor, Univ. of California, at Davis, Mathematics, 07/02-06/04.

Education

Ph.D. in Applied Mathematics, Univ. of California, Los Angeles, June 2002 (Advisor: Eitan Tadmor)
Thesis: *Adaptive High Resolution Recovery of Piecewise Smooth Data From its Spectral Information*

B.S. in Physics, minors in Chemistry and Mathematics, Univ. of Utah, July 1997

Journal Publications

1. *Improved restricted isometry constant bounds for Gaussian matrices*; SIAM Journal on Matrix Analysis, submitted. (with Bubacarr Bah)
2. *Coarse quantization for random interleaved sampling of bandlimited signals*; Mathematical Modelling and Numerical Analysis, submitted. (with Alexander M. Powell, Yang Wang, and Ozgur Yilmaz)
3. *Phase transitions for greedy sparse approximation algorithms*; Applied and Computational Harmonic Analysis, submitted. (with Jeffrey D. Blanchard, Coralia Cartis, and Andrew Thompson)
4. *Observed universality of phase transitions in high-dimensional geometry, with implications for modern data analysis and signal processing*; Philosophical Transactions of The Royal Society A, Vol. 367(1906) 4273-4293. (with David L. Donoho).
5. *Precise undersampling theorems*; Proceedings of the IEEE, Vol. 98(6) (2010) 913-924. (with David L. Donoho)
6. *Decay properties for restricted isometry constants*; IEEE Signal Processing Letters, Vol. 16(7) (2009) 572-575. (with Jeffrey D. Blanchard and Coralia Cartis)
7. *Compressed Sensing: How sharp is the Restricted Isometry Property*; SIAM Review, accepted. (with Jeffrey D. Blanchard and Coralia Cartis)
8. *Counting the faces of randomly-projected hypercubes and orthants, with applications*; Discrete and Computational Geometry, Vol. 43(3) (2010) 522-541. (with David L. Donoho)
9. *Exponential bounds implying construction of compressed sensing matrices, error-correcting codes and neighborly polytopes by random sampling*; IEEE Transactions on Information Theory, Vol. 56(4) (2010) 2002-2016. (with David L. Donoho)
10. *Identification of Matrices having a Sparse Representation*; IEEE Transactions on Signal Processing, Vol. 56(11) (2008) 5376-5388. (with Gotz E. Pfander and Holger Rauhut)
11. *Counting faces of randomly-projected polytopes when the projection radically lowers dimension*; Journal of the AMS, Vol.22(1) (2009) 1-53. (with David L. Donoho)
12. *Neighborliness of Randomly-Projected Simplices in High Dimensions*; Proceedings of the National Academy of Sciences, Vol. 102(27) (2005) 9452-9457. (with David L. Donoho)

13. *Sparse Nonnegative Solutions of Underdetermined Linear Equations by Linear Programming*; Proceedings of the National Academy of Sciences, Vol. 102(27) (2005) 9446-9451. (with David L. Donoho)

14. *Robust reprojection methods for the resolution of Gibbs phenomenon*; Applied and Computational Harmonic Analysis, Vol. 20(1) (2006) 3-25. (with Anne Gelb)

15. *Fast reconstruction methods for bandlimited functions from periodic nonuniform sampling*; SIAM J. on Numerical Analysis, Vol. 44(3) (2006) 1073-1094. (with Thomas Strohmer)

16. *Optimal Filter and Mollifier for Piecewise Smooth Spectral Data*; Mathematics of Computation, Vol. 75(254) (2006) 767-790.

17. *Adaptive Filters for Piecewise Smooth Spectral Data*; IMA Journal of Numerical Analysis, Vol. 25(4) (2005) 635-647. (with Eitan Tadmor)

18. *Implementations of Shannon's sampling theorem, a time-frequency approach*; Sampling Theory in Signal and Image Processing, Vol. 4(1) (2005) 1-17. (with Thomas Strohmer)

19. *Adaptive Mollifiers - High Resolution Recover of Piecewise Smooth Data from its Spectral Information*; Foundations of Computational Mathematics, Vol. 2(2) (2002) 155-189. (with Eitan Tadmor)

20. *Iterative Reconstruction of Fluorine-18 SPECT Using Geometric Point Response Correction*; Journal of Nuclear Medicine, Vol. 39(1) (1998) 124-130. (with Gengsheng L. Zeng, Grant T. Gullberg, Chuanyong Bai, Paul E. Christian, Frederick Trisjono, Edward V.R. Di Bella, and Hugh T. Morgan)

Proceedings

1. *Phase transitions for restricted isometry properties*; Proceedings of Signal Processing with Adaptive Sparse Structured Representations, April 2009. (with Jeffrey D. Blanchard and Coralia Cartis)

2. *Fast reconstruction algorithms for periodic nonuniform sampling with applications to time-interleaved ADCs*; Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing, April 2007. (with Thomas Strohmer)

3. *Thresholds for the Recovery of Sparse Solutions via L1 Minimization*; Proceedings of the Conference on Information Sciences and Systems, March 2006. (with David L. Donoho)

4. *An Adaptive Order Godunov Type Central Scheme*; "Hyperbolic Problems: Theory, Numerics, Applications", Proceedings of the 9th International Conference in Pasadena, March 2002 (T. Hou and E. Tadmor, eds.), Springer, 2003, 871-880. (with Eitan Tadmor)

Prizes, Honors, and Awards - Selected

Philiip Leverhulme Prize, 2009-2012
Awarded annually to 25 UK researchers under the age of 35, 5 awards in mathematics triannually.

Sloan Research Fellow in Science and Technology, 2007-2009
Awarded annually to approx. 20 Fellows in Mathematics from junior faculty in the USA and Canada

Monroe H. Martin Prize (Applied Mathematics), IPST - U. of Maryland, 2005
Awarded every five years to two junior faculty for a single authored paper of significant merit

NSF Postdoctoral Fellowship in the Mathematical Sciences, 06/04-06/06
Awarded to approximately 35 researchers annually, fully supporting 2 years of research, $108,000

Fox Prize (Numerical Analysis), Cambridge University, First Place, 2003
Awarded bi-annually to six or seven researchers in Numerical Analysis, under 31 years of age

Editorial Duties

IEEE Signal Processing Letters, Associate Editor, 2009-2011

IEEE Selected Topics in Signal Processing, Guest Editor,
Special issue on Compressive Sensing, Vol. 4(2), 2010.

Plenary Conference/Workshop Lectures

Statistique Fonctionnelle et Operatorielle, Dijon France, June. 18-19, 2009.

Workshop on Sparsity and Compressive Sensing, Antalya Turkey, Apr. 11, 2009.

Sparsity in Machine Learning and Statistics, London England, Apr. 1-3, 2009.

Scottish Computational Mathematics Symposium, Edinburgh Scotland, Sep. 10, 2008.

New Directions in Tomographic Image Reconstruction, Manchester England, June 30 - July 1, 2008.

Nonlinear Approximation Techniques Using L1, Texas USA, May 16-18, 2008.

Nonlinear and Adaptive Approximation in High Dimensions, Bad Honnef Germany, Dec. 10-15, 2007.

Twentieth Annual Pacific Northwest Numerical Analysis Seminar, British Columbia, Sept. 30, 2006.

Sampling Theory and Application, Samsun Turkey, July 10-15, 2005.

5th Bay Area Scientific Computing Day, LL-Berkeley Labs, March 13, 2004.

Long Term Programs

Statistical Theory and Methods for Complex, High-Dimensional Data, Isaac Newton Institute for Mathematical Sciences, University of Cambridge, January - June, 2008. Visiting Fellow.

Modern Methods of Time-Frequency Analysis, Erwin Schrodinger Institute, University of Vienna, April - July, 2005. Visiting Fellow.

Multiscale Geometry and Analysis in High Dimensions, Institute for Pure & Applied Mathematics, UCLA, September - December, 2004. Core participant.

Grants (grants under $4000 excluded):

Visiting Professorship for Hans Feichtinger (Univ. of Vienna), 2008, Leverhulme Trust.
£18,786, Principal Investigator.

High-Dimensional Nonparametric Density Estimation for the Analysis of Images and Shapes, 2008. National Science Foundation, $474,000, Co-Principle Investigator.

Analog-to-Information, 2005. DARPA, in excess of $1,000,000, Consultant (with David L. Donoho).

Contributed Conference Talks - Selected from over 30

International Symposium on Mathematical Programming–Compressed Sensing session, 2009 (USA).

Signal Processing with Adaptive Sparse Structured Representations, 2009 (France).

Joint Mathematics Meetings–Mathemtics of Information and Knowledg e session, 2009 (USA).

INSPIRE Sparsity Workshop, 2008 (UK).

SIMAI (Italian version of SIAM), 2008 (Italy).

International Congress on Industrial and Applied Mathematics, 2007 (Switzerland).

International Congress on Industrial and Applied Mathematics, 2007 (Switzerland).

IEEE Conference on Information Sciences and Systems, 2006 (USA).

Sampling Theory and Application, 2003 (Austria) and 2005 (Turkey).

International Conference On Spectral and High Order Methods, 2004 (USA).

Hyperbolic Problems: Theory, Numerics, and Applications, 2002 (USA) and 2004 (Japan).

Colloquium and Seminar Talks - beginning with most recent

Univ. College London, Queen Mary Univ. London, Imperial College London, Univ. of Edinburgh, International Univ. Bremen, Harvard Univ., Arizona State Univ., Brown Univ., Univ. of Maryland College Park, Univ. of Cambridge, Univ. of Oxford, Paris VI, Warwick Univ., Stanford Univ., Univ. of Calgary, Univ. of British Columbia, Simon Frasier Univ., Univ. of Utah, Univ. of Wisconsin Madison, Univ. of California Davis, Rice Univ., California Institute of Technology, Univ. of South Carolina, Univ. of Novi Sad (Serbia), Univ. of Vienna, Lawrence Livermore National Labs, Univ. of California Los Angeles.

Leadership Activities

Organizer for Scottish Computational Mathematics Symposium, Edinburgh Scotland, 2009.

Minisymposium organizer for Warwick Scientific Computing Capstone Conference 2009.

Invitor of invited speakers for European Meeting of Statisticians 2009.

Special sessions organizer for Sampling Theory and Applications 2009.

Technical Program Committee for SPARS09, about 80 participants.

Member of the Scientific Committee for the Smith Institute (Oxford) Knowledge Transfer Network for Industrial Maths, since 2007.

Organiser for UK Sparse Approximation day meeting November 3rd, International Centre for Mathematical Sciences - Edinburgh. Seven invited speakers, anticipated 35 participants.

Chair Organising committee for the 2007 AMS Von Neumann Symposium - Sparse Representations and High Dimensional Geometry. 86 participants, in excess of $40,000 raised from four institutions (NSF, SIAM, AMS, MAA) to fund plenary speakers, invited speakers, and graduate students.

Organising committee for three mini-symposium on Compressed Sensing at the 2007 International Congress on Industrial and Applied Mathematics, 12 speakers.

Organising committee for IPAM short course May 30 - June 1, 2007 Sparse Representations and High Dimensional Geometry. Eight speakers and 54 participants, over 80% of participants (many international) fully funded.

Industry Interactions

HRL Laboratories - a major research consortium (including Boeing and General Motors) specialising in microelectronics, sensors, materials, information processing, and applied electromagnetics. As part of a Defence Advances Research Program Agency (DARPA) initiative *Analog-to-Information* I aided research team of eight members at HRL to use Compressed Sensing and assisted in its development for the next generation analog-to-digital converters. Consultant 2005-2007.

Refereeing Services

National Science Foundation panel and individual grant referee for Mathematics and Computer Science

Referee for: Mathematics of Computation, SIAM J. Numerical Analysis, J. of Fourier Analysis and Applications, Applied and Computational Harmonic Analysis, SIAM J. Scientific Computing, J. of Computational Physics, IMA J. of Numerical Analysis, Foundations of Computational Math., Computing in Science & Engineering, IEEE Transactions on Circuits and Systems I, Applied & Numerical Mathematics, EURASIP J. on Applied Signal Processing, Electronic J. on Numerical Analysis, Linear Algebra and Applications, Proceedings of the National Academy of Sciences, Inverse Problems, Physica D (Nonlinear Phenomenon), Math. Reports of the Academy of Sciences Royal Society, Transactions on Math. Software, Communications in Math. Sciences, IEEE Transactions on Information Theory, SIAM J. on Imaging Sciences, IEEE Transactions on Signal Processing.

Supervisions

•Postdoc supervisor for Jeffrey Blancard, 2007-current
•PhD supervisor for Bubacarr Bah, 2008-current