Dmitry Batenkov, Ph.D

Contact information

Current address:	Department of Mathematics Massachusetts Institute of Technology, Cambridge, MA 02139, USA
Current position:	Post-doctoral associate
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Research interests

Spectral jump discontinuity detection, Prony systems, super-resolution

Numerical analysis

Sparse signal/image processing

Education

2009-2014	Ph.D. in Mathematics, Weizmann Institute of Science, Israel. Supervisor: Professor **Y.Yomdin**. Thesis title: **Algebraic Reconstruction of Geometric Models from Integral Measurements**
1999-2002	B.A. in Computer Science (Summa cum Laude), Technion, Israel.

Awards and fellowships

2015-2016	Lady Davis Postdoctoral Fellowship
2013	Best Student Paper Award, SAMPTA 2013.
2013	Rotschild Postdoctoral Fellowship (not accepted for family reasons)
2012	John F. Kennedy Prize for academic excellence and scientific accomplishments, awarded by the Weizmann Institute of Science
2011	Adams Fellowship for Doctoral Students, awarded by the Israeli Academy of Sciences
2000-2002	Technion President List Excellent Student
2001-2002	Technion CS Department Excellent Students Program (SAMBA)
2001	Knesset (Israeli Parliament) Committee for Education and Culture Excellent Student

Academic employement

2016	Post-doctoral associate, Massachusetts Institute of Technology, USA

2015	Post-doctoral research position, Technion, Israel.
2014	Post-doctoral research position, Ben Gurion University, Israel.
2012-2013	Teaching assistant at the Department of Mathematics, Weizmann Institute of Science, Israel. (Courses: Analysis for High School Teachers, Geometry for High School Teachers.)
2001-2002	Teaching assistant at the Faculty of Computer Science, Technion, Israel. (Courses: Introduction to Computer Science, Logic for Computer Science.)

Professional military service

2002-2008	Software Engineer and Team Leader, MAMRAM, Israel Defense Forces.

Community service

Reviewer	Mathematical Reviews, Constructive Approximation, Signal Processing Letters, IEEE Transactions on Signal Processing, Computer-Aided Geometric Design
Editorial Boards	XRDS: ACM Student Magazine (2009-2011).

Technical skills

Languages	English (fluent), Hebrew (fluent), Russian (mother tongue)
Programming	C/C++, C#/ASP.NET, Java, Javascript/HTML, Perl, Python
Scientific comp.	MATLAB/Octave, NumPy/SciPy, R

Software development experience

2011-2015	iClean (`http://iclean.org.il`) - encourages people to help keep the environment clean. (Complete development.)
2010-2012	Photo-Animator (`http://photo-animator.com`) - online easy creation of beautiful movies from album photos. (Contributed algorithms for object recognition, modelization and animation.)
2001	TCP/IP Header Compression for Satellite Environment (Supervised by Dr. Itai Dabran, Prof. Reuven Cohen, Technion.)
2001	Spatial Openness Index Calculator (Supervised by Dr. Israel A. Wagner, Technion/IBM.)
2001	Spread Spectrum Image Steganography (Supervised by Prof. Alfred M. Bruckstein, Technion.)

List of publications

Preprints

[1] Dmitry Batenkov and Yosef Yomdin. Taylor Domination, Difference Equations, and Bautin Ideals. *arXiv:1411.7629 [math]*, November 2014. arXiv: 1411.7629.

Peer-reviewed journal papers

[2] Dmitry Batenkov. Accurate solution of near-colliding Prony systems via decimation and homotopy continuation. *To appear in Theoretical Computer Science*, 2016. arXiv: 1501.00160.

[3] Dmitry Batenkov. Stability and super-resolution of generalized spike recovery. *To appear in Applied and Computational Harmonic Analysis*, 2016.

[4] Dmitry Batenkov and Yosef Yomdin. Taylor domination, Turán lemma, and Poincaré-Perron sequences. In Boris Mordukhovich, Simeon Reich, and Alexander Zaslavski, editors, *Contemporary Mathematics*, volume 659, pages 1–15. American Mathematical Society, Providence, Rhode Island, 2016.

[5] D. Batenkov. Complete Algebraic Reconstruction of Piecewise-Smooth Functions from Fourier Data. *Mathematics of Computation*, 84(295):2329–2350, 2015.

[6] D. Batenkov, O. Friedland, and Y. Yomdin. Sampling, Metric Entropy and Dimensionality Reduction. *SIAM J.Math.Anal.*, 47(1):786–796, 2015.

[7] D. Batenkov and Y. Yomdin. Local and Global Geometry of Prony Systems and Fourier Reconstruction of Piecewise-Smooth Functions. In *Operator-Related Function Theory and Time-Frequency Analysis*, pages 57–76. Springer, 2015.

[8] Dmitry Batenkov and Gal Binyamini. Uniform upper bounds for the cyclicity of the zero solution of the Abel differential equation. *Journal of Differential Equations*, 259(11):5769–5781, 2015.

[9] Dmitry Batenkov, Niv Sarig, and Yosef Yomdin. Accuracy of Algebraic Fourier Reconstruction for Shifts of Several Signals. *Sampling Theory in Signal and Image Processing*, 13(2):151–173, 2014.

[10] Dmitry Batenkov and Yosef Yomdin. Geometry and Singularities of the Prony mapping. *Journal of Singularities*, 10:1–25, 2014.

[11] D. Batenkov, V. Golubyatnikov, and Y. Yomdin. Reconstruction of Planar Domains from Partial Integral Measurements. *Contemporary Mathematics*, 591:51–66, 2013.

[12] D. Batenkov and Y. Yomdin. On the accuracy of solving confluent Prony systems. *SIAM J. Appl. Math.*, 73(1):134–154, 2013.

[13] Dmitry Batenkov and Gal Binyamini. Moment vanishing of piecewise solutions of linear ODEs. *To appear in Springer Proceedings in Mathematics & Statistics*, 2013.

[14] D. Batenkov, N. Sarig, and Y. Yomdin. An "algebraic" reconstruction of piecewise-smooth functions from integral measurements. *Functional Differential Equations*, 19(1-2):13–30, 2012.

[15] D. Batenkov and Y. Yomdin. Algebraic Fourier reconstruction of piecewise smooth functions. *Mathematics of Computation*, 81:277–318, 2012.

[16] Dmitry Batenkov. Open BEAGLE: a generic framework for evolutionary computations. *Genetic Programming and Evolvable Machines*, pages 1–3, 2011. 10.1007/s10710-011-9135-4.

[17] D. Batenkov. Moment inversion problem for piecewise D-finite functions. *Inverse Problems*, 25(10):105001, October 2009.

Peer-reviewed conference proceedings

[18] Andrey Akinshin, Dmitry Batenkov, and Yosef Yomdin. Accuracy of spike-train Fourier reconstruction for colliding nodes. In *2015 International Conference on Sampling Theory and Applications (SampTA)*, pages 617–621, May 2015.

[19] Dmitry Batenkov. Prony Systems via Decimation and Homotopy Continuation. In *Proceedings of the 2014 Symposium on Symbolic-Numeric Computation*, SNC '14, page 59–60, New York, NY, USA, 2014. ACM.

[20] D. Batenkov, N. Sarig, and Y. Yomdin. Decoupling of Fourier Reconstruction System for Shifts of Several Signals. In *Proceedings of the 10th International Conference on Sampling Theory and Applications (SAMPTA)*, 2013. Arxiv preprint arxiv:1305.2832.

[21] Dmitry Batenkov and Yosef Yomdin. Algebraic signal sampling, Gibbs phenomenon and Prony-type systems. In *Proceedings of the 10th International Conference on Sampling Theory and Applications (SAMPTA)*, 2013. arXiv preprint arXiv:1306.1097.

[22] D. Batenkov, G. Dinkin, and Y. Yomdin. Automatic animation of high-resolution images. In *Proc. of IEEE 27-th Convention of Electrical and Electronics Engineers in Israel*, 2012.

[23] D. Batenkov and Y. Yomdin. Algebraic reconstruction of piecewise-smooth functions from Fourier data. In *Proc. of Sampling Theory and Applications (SAMPTA)*, 2011.

[24] D. Batenkov, N. Sarig, and Y. Yomdin. An "algebraic" reconstruction of piecewise-smooth functions from integral measurements. In *Proc. of Sampling Theory and Applications (SAMPTA)*, 2009.

Invited Talks

[25] D. Batenkov. Stability of sparse exponential models and resolution of Gibbs phenomenon. In *Dagstuhl Seminar 15251 on Sparse modelling and multi-exponential analysis*, 2015.

[26] D. Batenkov. Inverse trigonometric moment problem for piecewise-smooth functions. In *Conference on Polyhedra, Lattices, Algebra, and Moments, National University of Singapore*, 2014.

[27] D. Batenkov. On the polynomial moment vanishing problem. In *Second Joint International Meeting of the Israel Mathematical Union and the American Mathematical Society*, 2014.

[28] D. Batenkov. Accurate Fourier reconstruction of piecewise-smooth functions. In *Research Workshop on Integral Transforms and Spectral Theory in Analysis and Geometry, Naharia, Israel*, 2013.

[29] D. Batenkov. Algebraic reconstruction of geometric models from integral measurements. In *2nd International Workshop on Geometry and Symbolic Computations, Haifa University*, 2013.

[30] D. Batenkov, G. Binyamini, and Y. Yomdin. P-recursive moment sequences of piecewise D-finite functions and Prony-type algebraic systems. In *18th International Conference on Difference Equations and Applications*, 2012.

[31] D. Batenkov and Y. Yomdin. Infinitesimal Smale-Pugh problem for Abel equation and Remez-type inequality for Mellin transform of algebraic functions. In *Israeli-Polish Mathemtaical Meeting, Lodz, Poland*, 2011.

[32] D. Batenkov and Y. Yomdin. Accuracy of shock determination from truncated Fourier data. In *5th International Conference "Inverse Problems: Modeling and Simulation"*, page 146, 2010.

Miscellaneous

[33] BATENKOV, D. Hands-on introduction to genetic programming. *XRDS 17* (September 2010), 46–ff.

[34] BATENKOV, D. Programmatic access to Wikipedia. *XRDS 17* (December 2010), 52–53.

[35] BATENKOV, D. Real-time detection with webcam. *XRDS 16* (June 2010), 50–51.

[36] BATENKOV, D. Analyzing EEG data. *XRDS 18* (September 2011), 36–37.

[37] BATENKOV, D. Boosting productivity with the Boost Graph Library. *XRDS 17* (March 2011), 31–32.

[38] BATENKOV, D. Web maps of renewable energy. *XRDS 17* (June 2011), 56–57.