

# Dr. Yuliya Babenko

Curriculum Vitae  
(updated Aug 30, 2009)

Department of Mathematics and Statistics  
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## Education

PhD. Mathematics, Vanderbilt University, USA, August 2006

M.A. Mathematics, Vanderbilt University, USA, May 2003

M.S. Mathematics, Dnepropetrovsk National University, Ukraine, July 2001

B.S. Mathematics, Dnepropetrovsk State University, Ukraine, Sept. 2000

Non-degree exchange student, Department of Computer Science, University of Georgia, USA, 1999 - 2000 (supported by ACTR/ACCELS scholarship)

Major: Computer Science

## Employment

Assistant Professor (tenure-track), Sam Houston State University, 2006-present

Graduate Student and Teaching Assistant, Vanderbilt University, 2001- 2006

Intern, Laboratory of Computer Visualization, University of Georgia, Summer 2000

Engineer, Laboratory of Titanium, Dnepropetrovsk State University, 1999

## Current Research Interests

Numerical Analysis, Computational Geometry, Spline Theory, Computer Aided Geometric Design, Approximation Theory, Theory of Functional and Polynomial Inequalities and Applications (in particular, to Inverse Problems)

**Publications**

Yuliya Babenko, S. Borodachov *Discrete Kolmogorov type inequalities for multiply monotone sequences*, submitted.

Yuliya Babenko, D. Skorokhodov *Kolmogorov and Stechkin problems for functions with second derivatives from Orlich spaces*, submitted.

Yuliya Babenko, *Asymptotics of the multilinear interpolation error in the weighted  $L_p$ -norm on admissible box partitions*, submitted.

Yuliya Babenko, V. Babenko, N. Parfinovych, D. Skorokhodov, *Exact asymptotics of the optimal  $L_p$ -error of asymmetric linear spline approximation*, submitted.

Yuliya Babenko, V. Babenko, N. Parfinovych, D. Skorokhodov, *On one extremal property of a regular simplex*, submitted.

Yuliya Babenko, V. Babenko, D. Skorokhodov, *Exact asymptotics of the optimal  $L_{p,\Omega}$ -error of linear spline interpolation*, East Journal on Approximations, V. 14, N. 3 (2008), pp. 285–317.

Yuliya Babenko, *Exact asymptotics of the uniform error of interpolation by multilinear splines*, to appear.

Yuliya Babenko, *Asymptotics of the weighted uniform error of linear spline interpolation of  $C^2$  functions and applications*, Approximation Theory XII: San Antonio 2007.

Yuliya Babenko, V. Babenko, A. Ligun, A. Shumeiko, *On asymptotical behavior of the optimal linear spline interpolation error of  $C^2$  functions*, East Journal on Approx., 12, N. 1 (2006), pp. 71–101.

Yuliya Babenko, A. Kroo, *Markov-type inequalities for homogeneous polynomials on non symmetric star-like domains*, Frontiers in Interpolation and Approximation, Taylor & Francis Group, USA, Editors N.K. Govil et.al, 2006, pp. 1–15.

Yuliya Babenko, V. Babenko, *On the Kolmogorov problem for the upper bounds of four consecutive derivatives of a multiply monotone function*. Constr. Approx. 26 (2007), no. 1, pp. 83–92

Yuliya Babenko, V. Babenko, *The Kolmogorov Inequalities for Multiply Monotone Functions Defined on a Half-line*, East Journal on Approximations, 11 (2005), no. 2, 169–186.

Yuliya Babenko, V. Babenko, *The Olovyanishnikov inequality for multivariate functions*, Approximation Theory: A Volume Dedicated to Borislav Boyanov, Academic Publishing House, Sofia, 2004.

Yuliya Babenko, V. Babenko, *The Kolmogorov inequality for absolutely monotone functions on a half-line*, Advances in constructive approximation: Vanderbilt 2003, 63–74, Mod. Methods Math., Nashboro Press, Brentwood, TN, 2004.

Yuliya Babenko, V. Babenko, *About Kolmogorov type inequalities for functions defined on a half line*, Constructive theory of functions, 205–208, DARBA, Sofia, 2003.

Yuliya Babenko, *Pointwise inequalities of Landau-Kolmogorov type for functions defined on a finite interval*, Ukrainian Mathematical Journal, V.52, N.2, 2001, pp. 270–275.

Yuliya Babenko, *Exact inequalities of Landau type for functions with second derivatives from Orlich spaces*, Bulletin of Dnepropetrovsk National University, 2001.

### **Manuscripts in preparation**

Yuliya Babenko, T. Leskevich *On the  $L_p$ -error of interpolation by splines of degree  $n$  in each variable.*

Yuliya Babenko, D. Skorokhodov *Pointwise Landau inequalities for functions of low smoothness.*

Yuliya Babenko, D. Skorokhodov *On the connections between norms of the derivatives of a multiply monotone function.*

Yuliya Babenko, V. Babenko *A note on Kolmogorov problem for absolutely monotone functions.*

### **Conferences Attended and Conference Presentations**

International Conference on Computational and Information Sciences, Houston, TX, April 29 - May 2, 2009.

*Adaptive spline interpolation in various settings, analysis of the error, and applications*

2nd International Workshop on Algebraic Geometry and Approximation Theory, Towson University, MD, April 9-11, 2009.

*On one extremal property of a regular simplex.*

3rd Workshop on Approximation Theory and Applications, SHSU, October 24-25, 2008.

*Exact asymptotics of the best asymmetric approximation of  $C^2$ -functions by linear splines in  $L_p$ -metric*

International Conference on Multivariate Approximation, Haus Bommerholz, September 21–26, 2008

*Asymptotics of the error of best uniform  $(\alpha, \beta)$ -approximation of  $C^2$  functions by linear splines.*

Conference on Approximation Theory Dedicated to the 70th Birthday of Jozsef Szabados, Alfred Renyi Institute of Mathematics Budapest, July 6-12, 2008.

*Kolmogorov problem for four numbers for multiply monotone functions of lower smoothness.*

9th International Meeting on Approximation Theory, Ubeda, Spain, June 28–July 2, 2008 (invited plenary lecture)

*Asymptotics of the error of adaptive spline interpolation*

Modern Approaches to Asymptotics of Polynomials, B.I.R.S., Banff, Canada, November 11–16, 2007

10th SIAM Conference on Geometric Design and Computing, November 4–8, 2007 San Antonio, TX, USA

*Error analysis for adaptive approximation by various classes of splines and mesh generation*

6th International Congress on Industrial and Applied Mathematics, Zurich, Switzerland, July 16–20, 2007.

*On asymptotically optimal error of interpolation by linear and multilinear splines*

Extremal Problems in Complex and Real Analysis, Moscow, Russia, May 22–26, 2007.

*Estimates of norms of subsequent derivatives of  $r$ -monotone functions*

Meeting of the Texas Section of the MAA, Edinburg, TX, April 12–14, 2007.

*Markov-type inequalities for homogeneous polynomials on non-symmetric star-like domains*

12th International Conference on Approximation Theory, San Antonio, TX, March 4–8, 2007.

*Asymptotically optimal choice of knots for interpolation and applications to numerical integration*

SIAM Conference on Geometric Design and Computing, Phoenix, AZ, October 31 – November 3, 2005

*On asymptotical behavior of optimal error of interpolation of  $C^2$  functions by linear and bilinear splines.*

Function Spaces, Approximation Theory, Nonlinear Analysis, Moscow, Russia, May 23-29, 2005

International Conference on the Interactions between Wavelets and Splines, The University of Georgia, Athens, Georgia, May 16–19, 2005.

*Asymptotically optimal triangulations for linear spline interpolants of piecewise  $C^2$  surfaces.*

Functional Analysis and Approximation Theory, Maratea, Italy, June 16-23, 2004.

*On existence of a function with prescribed norms of its derivatives.*

11th International Conference on Approximation Theory, Gatlinburg, TN, USA, May 18-22, 2004.

Advances in Constructive Approximation, Vanderbilt, USA, May 2003

*Inequalities of Kolmogorov type for special classes of functions.*

3rd International Conference, Multivariate Approximation Theory and Applications Cancun, Mexico, April 2003

*Olovyanishnikov Inequality for Multivariate Functions.*

Constructive Theory of Functions, Varna, Bulgaria, June 2002

*About Kolmogorov type inequalities for functions defined on a half line.*

International Conference on Functional Analysis and its Applications, Lviv, Ukraine, May 2002

*Inequalities of Kolmogorov type for  $r$ -monotone functions of many variables.*

Interregional Conference on Computer Modeling, Dniprodzerzhinsk, 1999

*Exact inequalities of Landau type for functions with second derivatives from Orlich spaces.*

International Conference on Approximation Theory and its Applications dedicated to the Memory of V.K.Dzyadyk, Kyiv, 1999

*Pointwise inequalities of Landau-Kolmogorov type for functions defined on a finite interval.*

### **Seminar / Colloquium Talks**

Colloquium, Department of Mathematics, Towson University, Baltimore, MD; May 2009

Colloquium, Department of Mathematical Sciences, UT-Dallas, February 2009

Seminar, Institute of Geometric Modeling and Industrial Geometry, Vienna University of Technology, Vienna, Austria; November 2008

Renyi Institute of Mathematics, Hungarian Academy of Sciences, Budapest, Hungary; November 2008.

Seminar, School of Mathematics, Tel-Aviv University, Israel, December 2007.

*Analysis of the error of adaptive spline interpolation*

Colloquium, University of Houston - Downtown, Houston TX; December 2007.

Colloquium, Institute of Biomathematics and Biometry, Munich, Germany, July 2007.

*Exact asymptotics of the error of adaptive spline interpolation.*

Colloquium, University of Hohenheim, Stuttgart, Germany, July 2007.

Applied Mathematics joint with Approximation Theory seminar, University of Utah, September 2006.

*On asymptotically optimal methods of adaptive spline interpolation*

Seminar, Renyi Institute, Budapest, Hungary, May 2006.

*On asymptotically optimal methods of spline interpolation of multivariate functions*

PhD Thesis defense, Vanderbilt University, April 2006.

*On the asymptotic behavior of the optimal error of spline interpolation of multivariate functions*

Seminar, Industrial Mathematics Institute, University of South Carolina, April 2006.

*On asymptotically optimal methods of interpolation by linear and other types of splines*

Colloquium, University of Alabama, Huntsville, February 2006.

*On asymptotically optimal methods of approximation by linear interpolating splines*

Computational Analysis Seminar, Vanderbilt University, February 2006.

*On asymptotically optimal partitions and the error of approximation by linear and bilinear splines*

Colloquium, Sam Houston State University, January 2006.

*On the error of interpolation of  $C^2$  functions by linear splines*

Computational Analysis Seminar, Vanderbilt University, September 2005.

*On Asymptotically Optimal Methods of Approximation by Linear and Bilinear Splines*

Seminar, University of Mannheim, Germany, July 2005.

*Exact Asymptotics of the Error of Interpolation of Piecewise  $C^2$  Surfaces by Linear Splines*

Colloquium, Hohenheim University, Stuttgart, Germany, July 2005.

*Kolmogorov type inequalities for some special classes of functions*

Seminar, INRIA Sophia Antipolis, France, July 2005

*Asymptotically optimal Triangulations for linear Spline Interpolants of Piecewise  $C^2$  functions*

Seminar, INRIA Sophia Antipolis, France, July 2005

*Kolmogorov type inequalities for some special classes of functions*

Computational Analysis Seminar, Vanderbilt University, November 2004.

*On existence of a function with prescribed norms of its derivatives*

Qualifying paper defense, Vanderbilt University, May 2003.

*Kolmogorov Type Inequalities for Special Classes of Functions*

### **Research Visits**

School of Mathematics, Tel-Aviv University, Israel, December 2007

Renyi Institute, Budapest, Hungary, May 2006

University of Mannheim, Germany, July 2005

Hohenheim University, Stuttgart, Germany, July 2005

INRIA Sophia Antipolis, France, July 2005 (invited by teams APICS and GEOMETRICA)

### **Honors and Awards**

*Enhancement Grant for Research*, SHSU, 2008 (funded \$ 18,000)

*SIAM Travel Grant to attend International Congress on Applied and Industrial Mathematics in Zurich*, 2007

*Travel Grants*, Vanderbilt University, 2003, 2004, 2005

*University Graduate Honor Fellowship*, Vanderbilt University, 2001-2005

*Teaching Assistantship*, Vanderbilt University, 2001-present

*Individual Scholarship at DSU 1999-2000*

*U.S. Government Scholarship ACTR/ACCELS (American Councils for International Education) to study for 1 year at the University of Georgia, 1999*

### **Scientific Organizational Activities**

Third Workshop on Approximation Theory and Applications, SHSU, October 2008.

Minisymposium “Error analysis for adaptive mesh generation” within Tenth SIAM Conference on Geometric Design and Computing

Second Workshop on Constructive Function Theory, SHSU, October 2007.

Minisymposium “Spline interpolation and quadrature formulae” within Twelfth International Conference on Approximation Theory, San Antonio, Texas, March 4–8, 2007.

Workshop “Contemporary questions in Constructive Function Theory”, SHSU, 08/07.

Weekly Research and Educational Seminar in Analysis and Geometry, SHSU, Spr. '07.

Weekly Research Seminar in Applied and Constructive Mathematics, SHSU, Fall 2006.

Educational Lecture Series “Seven Gems of Approximation Theory”, SHSU, Fall 2006.

### **Academic affiliation and refereeing**

- Member: American Mathematical Society, Society for Industrial and Applied Mathematics
- Referee: Constructive Approximation, Journal of Approximation Theory, East Journal on Approximation, Applied Numerical Mathematics
- Reviewer: Zentralblatt MATH

### **Teaching Experience**

Department of Mathematics and Statistics, SHSU

- Assistant Professor, 2006-now.
- Courses taught: Complex Analysis (graduate), Real Analysis I and II, Operations Research, Numerical Analysis, Calculus I, Calculus II, Mathematics for Liberal Arts, Mathematics for Managerial Decision Making, College Algebra, Trigonometry

Department of Mathematics, Vanderbilt University

- Teaching Assistant/Instructor (full responsibilities): Fall 2002 - Spring 2006
- Teaching Assistant/Tutor (tutored study halls) : Fall 2001- Spring 2002

- Courses taught: Calculus I, Calculus II, Accelerated Calculus I for Engineers, Accelerated Calculus II for Engineers

### **Training**

Texas NExT (New Experiences in Teaching) Fellow 2006-2008

Graduate Teaching Certificate (awarded by the Center for Teaching and the Graduate School)

Completed F2P2 (Future Faculty Preparation Program) organized by the Center for Teaching at Vanderbilt. In particular participated in Professional Development Cohort, Course Design Cohort, workshops on Grant Proposals writing, Classroom Assessment Techniques, Lectures that Motivate Learning, Scholarship in the Digital Age, Race in Academe, and series of other workshops, working groups and panel discussions.

Professional development course (taught at the Department of Mathematics)

### **Other Activities**

Organized and participated at the panel discussion *Academic Job Market* at the Career Center at Vanderbilt, April 2006

Panelist at the discussion *Mistakes to avoid in Graduate School* as part of "Women in Academe" series, October 2005

Panelist at the discussion *Teaching in the American Classroom* organized by Derek Bruff and Center for Teaching, September 2005

Designed and lead workshop *Extracurricular Activities as Learning Tools* at the Grad-STEP 2005 conference (sponsored by the Center for Teaching at Vanderbilt)

Co-founder, organizer, and graduate student advisor, Math Club at Vanderbilt University (January 2005-August 2006)

### **Service to the Department and University**

Undergraduate advisor, Spring 2009 - present.

Organizing Committee for Piney Woods Lecture Series (to bring prominent female mathematicians on campus)

MTH 141 (Precalculus) Committee, Spring 2009.

Masters Program Committee, Fall 2007.

University Minority Committee, 2007-2008.

Mathematics Hiring Committee, 2006-2007

College Algebra textbook selection committee, Spring 2007.

**Skills**

- Computer skills: C, C++, Java, Pascal, Matlab, Maple, Mathematica, LaTeX, TeX, HTML
- Languages: English (fluent), Russian (native), Ukrainian (native), Belorussian (fluent), Polish, Slovak, Czech, and Croatian (basic speaking/intermediate reading)

**Personal Information:**

DOB: June 20, 1979

Sex: Female

**Some References:****Larry L. Schumaker**

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