

ANDREY BIRYUK

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Research interests

- Mathematical Finance: Derivative Pricing, Performance Analysis, Model Validation.
- Nonlinear Partial Differential Equations, Differential Geometry, Ordinary Differential Equations.
- Random Processes, Stochastic PDEs, Invariant Measures.
- Harmonic Analysis, Viscosity Solutions.
- Applied Mathematics, Modelling, Numerical Methods.

Education

1998 – 2001

PhD in Mathematics from Heriot-Watt University, Edinburgh.

Thesis title: “Estimates for Spatial Derivatives of Solutions for Quasilinear Parabolic Equations with Small Viscosity”, supervised by Prof. S. Kuksin. In this thesis I explored the analytic properties of solutions of partial differential equations, such as behavior for large time and dependence upon the initial data.

1993 – 1998

Msc in Mathematics from Moscow State University (Diploma with Honor).

Average grade : 100% .

1993 – 1998

Msc in Mathematics from the Independent University of Moscow.

Average grade : 98.4% .

Positions

Jul 07 — Present

Quantitative Analyst at Credit Suisse, London, UK. Validation of financial models using market data, optimization of hedging strategies, numerical risk analysis and simulations.

Sep 06 -Jun 2007

Postdoctoral fellow at the Center for Mathematical Analysis, Geometry, and Dynamical Systems of the Department of Mathematics of Instituto Superior Técnico, Lisbon, Portugal. Invariant measures, Mather theory, Nonlinear Schrödinger equation. Reporting progress to the president of the math department, Diogo Gomes.

Aug 03 – Aug 06

Canada Research Chair Postdoctoral fellow at McMaster University (Hamilton). Conducting research in applied mathematics. Reporting progress in conferences and research group meetings.

Aug 03 – Jun 04

J. E. Marsden Postdoctoral fellow at the Fields Institute for Research in Mathematical Sciences, Toronto. This was a special thematic year, dedicated to PDE.

Jan – Aug 2003

Research Associate at Heriot-Watt University, Edinburgh. Stochastic Euler equation. Numerical Analysis. Comparing numerical results with the turbulence theory predictions.

Sep 2001 – Dec 2002

Researcher and teaching assistant at the Independent University of Moscow. Algebra and PDE research. Writing C/C++ code for solving PDE numerically. Tutoring international students in the “Math in Moscow” program.

Teaching

2006

McMaster University. Instructor: Graduate course in Complex Analysis.

2005

McMaster University. Instructor: Complex Analysis, approx. 80 students.

2004

McMaster University. Instructor: Ordinary Differential Equations, approx. 220 students.

2003 – 2004

Series of invited lecture presentations and talks for the Fields Institute graduate courses and workshops.

2001 – Dec 2002

Independent University of Moscow. Teaching assistant: Algebra. Tutoring, grading exams. Tutor for international students in the *Math in Moscow* program.

1998 – 2001

Heriot-Watt University. Teaching assistant: Calculus. Helping students, grading tests.

1995 – 1996

Seminars on Mathematics for high-school students, Moscow State University. Tutoring.

1995, 1996

Preparing talented high school students for the International Mathematics Olympiad. Teaching summer schools and preparing study materials. Krasnodar region, Russia.

Awards, Honors, and Distinctions

1998-2001	U.K. Overseas Research Student Grant: ORS/1998018003.
1995	Open Society (ISSEP) Soros Student Grant.
1993	Silver Medal of the 34 th International Mathematical Olympiad (Istanbul).
1992, 1993	Winner of Russian Mathematical Olympiad.
1991	Winner of Russian Physics Olympiad.

Journals refereed

Proceedings of the Royal Society A; Numerical Methods for Partial Differential Equations; Russian Math. Surveys.

Recent Grant Support

- Alexander von Humboldt foundation postdoctoral research grant. Germany, 2007-2009. (Declined)
- NATO Summer School. Hamiltonian Dynamical Systems and applications. Université de Montréal, Montreal, Canada, 2007. (Declined)
- Fourth European Congress of Mathematics, KTH, Stockholm, Sweden, 2004.

Selected invited talks

- *Measure Theory with applications to financial modelling*. Credit-Suisse, London, UK, 02 Nov 2007.
- *Particle flows and turbulence*. University of Saskatchewan, Saskatoon, Canada, 15 Mar 2007.
- *On Boltzmann equation*. Heriot-Watt University, Edinburgh, UK, 9 Mar 2007.
- *Weak Solutions of the Navier-Stokes system, singular sets and uniqueness*. IST, Lisboa, Portugal, 28 Feb 2007.
- *Particle flows and turbulence*. University of Calgary, Calgary, Canada, 14 Feb 2007.
- *Invariant measures of the Lagrangian Action*. McMaster University, Hamilton, Canada, 9 Feb 2007.
- *Minimizing measures*. Fields Institute, Toronto, Canada, 7 Feb 2007.
- *Particle flows and turbulence*. University of Guelph, Guelph, Canada, 2 Feb 2007.
- *An Abstract nonlinear Cauchy-Kowalewski Theorem in a Scale of Banach Spaces II*. IST, Lisboa, Portugal, 31 Jan 2007.
- *Global strong solutions to the Boltzmann equation*. Université de Cergy-Pontoise, Cergy-Pontoise, France, 29 Jan. 2007.
- *Micro-local analysis of the Navier-Stokes Equation*. Université de Rennes, Rennes, France, Jan 2007.
- *An Abstract nonlinear Cauchy-Kowalewski Theorem in a Scale of Banach Spaces*. IST, Lisboa, Portugal, Jan 2007.
- *Strong solutions of the Boltzmann equation in slab geometry*. Universidade de Lisboa, Portugal, Dec 2006.
- *Analysis of a pressureless dynamical system and an open geometrical problem*. IST, Lisboa, Portugal, Dec 2006.
- *Viscosity solutions and Aubry-Mather measures*. McMaster, Hamilton, Canada, Nov 2006.
- *Suitability of solutions for the Navier-Stokes system*. Kuban State University, Krasnodar, Russia, June 2006.
- *Navier Stokes system: singular sets. Navier Stokes system: Decay of the Fourier coefficients. Solutions of the Boltzmann equation with 1D symmetry*. Three talks on Mathematical Hydrodynamics International Workshop, Russian Academy of Science, Moscow, Russia, Jun 2006.
- *Strong solutions to the the Boltzmann equation*. University California Santa-Barbara, Santa-Barbara, USA, Jan 2006.
- Talk with Robert Brandenberger about *Variational Principle and Cosmology*. McGill University, Montreal, Jan 2006.
- *Progress in Navier-Stokes and Boltzmann equations*. Boston University, Boston, USA, Jan 2006.
- *Understanding the Boltzmann equation*. BIRS Workshop 05w5506, New Directions in PDE, Banff, Canada, Jul 2005.
- *Infinite energy solutions of multi-dimensional Burgers-type equations*. CMS/CSHPM Summer 2005 Meeting, University of Waterloo, Waterloo, Canada, Jun 2005.
- *On the lower bounds of the spatial decay of solutions for the Navier-Stokes equation*. Deterministic and stochastic Navier-Stokes equations, Palo-Alto, USA, Mar 2005.
- *Hydrodynamics*. Kuban State University, Krasnodar, Russia, Aug 2004.
- *On local energy dissipation for Navier-Stokes equation*. Institute of Mathematical Modeling, Moscow, Russia, Jul 2004.
- *Differential geometry and PDE*. Satellite working group within Workshop on Hamiltonian Dynamical systems (at CRM, Montreal), Montreal, Canada, May 2004.
- *NLS with small viscosity*. Workshop on Nonlinear Wave Equations, Toronto, Canada, Mar, 2004.
- Numerous talks at McMaster University, Hamilton, Canada, 2003-2006.
- Numerous talks at the Fields Institute, Toronto, Canada, 2003-2004.
- *Degenerate vector fields w.r.t. generalised Burgers type equations*. Mathematical Theory of Hyperbolic Systems of Conservation Laws, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, Mar 2003.
- *Geometry of Burgers equation and Turbulence*. University of Hull, UK, Mar 2003.
- *On generalized multidimensional Burgers type equations*. Département de Physique Théorique de l'Université de Genève, Feb 2003.
- Numerous talks at Moscow State University and at the Independent University of Moscow, 2001-2002.
- *On generalized equations of Burgers type with small viscosity*. Petrovskii Centenary Conference "Differential Equations and Related Topics", Moscow, May 2001.
- *Estimates for derivatives of the Burgers equations in terms of viscosity*. Analytical and Statistical Approaches to Fluid Models, Oberwolfach, Germany, Sep 2000.
- *Spectral Properties of Solutions of the Generalized Burgers Equation*. British Applied Mathematics Colloquium (BAMC), Manchester, UK, Apr 2000.