Curriculum Vitae
Timofey Shilkin

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Last name: Shilkin
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Date of Birth: August 7, 1971
Place of Birth: St.-Petersburg (former Leningrad), Russia
Marital Status: married, 2 sons born in 2008 and 2012

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Math-Net.Ru: http://www.mathnet.ru/rus/person33813

Education:

- Ph.D. Degree: V.A. Steklov Mathematical Institute, St.-Petersburg Branch, 1997. Candidate dissertation "On the regularity for generalized solutions to mathematical problems of the plasticity theory and the theory of non-Newtonian fluids" in specialty: "Differential Equations". Advisor - Professor Gregory A. Seregin.
- Master Degree: St.-Petersburg State Polytechnical University, 1994. Diploma with honors in speciality: "Applied Mathematics". Advisor - Professor Gregory A. Seregin.
- High School: Graduated from St.-Petersburg Lyceum 30 in 1988.

Awards:

"Young Mathematician" prize of the St. Petersburg Mathematical Society, 1996-1997
http://www.mathsoc.spb.ru/mol_mat.html

Employment:

2004-now:	senior scientific researcher, V.A. Steklov Mathematical Institute, St.-Petersburg Branch
2019-now:	associate professor of Department of Mathematics and Computer Science, St.-Petersburg State University
2022-2023:	visiting W3 professor, University of Saarland, Germany
2018-2019:	associate professor at BSc program in Mathematics and TCS, St.-Petersburg State University
Fall 2017:	associate professor at St.-Petersburg Academic University
2013-2016:	associate professor of Mathematics and Mechanics Faculty, St.-Petersburg State University
Spring 2007:	visiting assistant professor, Arizona State University, USA
Spring 2005:	visiting assistant professor, Arizona State University, USA
1997-2003:	scientific researcher, V.A. Steklov Mathematical Institute, St.-Petersburg Branch
1994-1997:	graduated student, V.A. Steklov Mathematical Institute
1994-1995:	assistant Professor, Department of Applied Mathematics, St.-Petersburg State Polytechnical University

Teaching Experience:

Undergraduate courses in Russia:

- Functional Analysis [St.-Petersburg Polytechnical University, 1994]
- Basic PDE course [St.-Petersburg State University, Department of Mathematics and Computer Science, 2018, 2019, 2020]
- Undergraduate course on ODEs [seminars at Academic University, 2017]
- First order PDEs and the Euler equations [St.-Petersburg State University, Department of Mathematics and Computer Science, announced in Spring 2023, on-line]
- Various courses on PDEs and related topics (boundary value problems, Sobolev spaces, theory of distributions, theory of potentials, harmonic functions, harmonic analysis, singular integrals and others)

Graduate courses in Russia:

- Parabolic Equations [St.-Petersburg State University, Department of Mathematics and Computer Science, 2022]
- Mathematical Theory of the Navier-Stokes Equations [St.-Petersburg State University, Department of Mathematics and Computer Science, 2022]
- Graduate courses on regularity of solutions to nonlinear elliptic equations and systems

Courses on physics for students of mathematical faculty:

- Electrodynamics [St.-Petersburg State University, Mathematics and Mechanics Faculty 2014, 2015, Department of Mathematics and Computer Science, 2019, 2020]
- Mathematical Foundations of Fluid Mechanics [St.-Petersburg State University, Mathematics and Mechanics Faculty, 2014, Saarland University, 2023]
- Mathematical Foundations of Quantum Mechanics [St.-Petersburg State University, Mathematics and Mechanics Faculty, 2015, 2016, Department of Mathematics and Computer Science, 2021]

Courses in the US (at the Arizona State University):

- Undergraduate course on Linear Algebra [MAT 342 at the ASU, 2006]
- Undergraduate course on Introduction to Mathematical Structures [MAT 300 at the ASU, 2008]

On-line courses and mini-courses:

- Mathematical theory of the 2D Euler Equations (mini-course for the seminar on Industrial Mathematics of Chebyshev Laboratoty, 3 lectures, November 2020)
- Mathematical Foundations of Quantum Mechanics (on-line course for Gdansk University of Technology, 15 lectures, March 2022, canceled as the war in Ukraine started)
- De Giorgi and Moser Techniques for Elliptic Equations (mini-course for Fudan University, 4 lectures, May 2022)
- Higher Integrability Technique for Elliptic Equations (mini-course for Fudan University, 4 lectures, announced in December 2022)

Research Interests:

Main activities in mathematical hydrodynamics, general theory of nonlinear partial differential equations, its applications to problems motivated by the mechanics of continuum media. At present the main areas are:

- existence and regularity of solutions to the Navier-Stokes equations
- regularity theory for elliptic and parabolic equations and systems
- zero viscosity limit, the Euler equations, boundary layer
- non-Newtonian fluids: modelling, solvability and regularity theory

Conferences:

1. International Conference "Recent Trends and Advances in PDEs and Numerical PDEs", Iowa State University, Ames, Iowa, USA, August 2-5, 1998.
2. "Analysis and Approximation of Boundary Value Problems", University of Jyvaskyla, Jyvaskyla, Finland, October 15-16, 1998.
3. "Topics on Fluid Dynamics", Coimbra, Portugal, July 1999.

4. International Conference "Differential Equations and Related Topics" dedicated to the Petrovskii 100-th anniversary, Moscow State University, Russia, May 22-27, 2001.
5. "Topics on Regularity for Partial Differential Equations", CMAF / Lisbon University, Portugal, November 10-12, 2001 (member of the Organizing Committee).
6. "Navier-Stokes Equations and Related Topics", St.-Petersburg, Russia, September 11-19, 2002 (talk, member of the Organizing Committee).
7. Conference in honor of Prof. V.A. Solonnikov 70-th anniversary, Obidos, Portugal, June 2003.
8. Italian-Russian Workshop "Directions on Partial Differential Equations", Ferrara, Italy, November 6-9, 2003.
9. International Workshop on the Navier-Stokes equations, Keio University, Yokohama, Japan, May 6-8, 2004.
10. International Conference "Differential Equations and Related Topics" dedicated to I.G. Petrovskii, Moscow, Russia, May 16-22, 2004.
11. International Conference "Partial Differential Equations in Mathematical Physics" (in memory of Olga A. Ladyzhenskaya), Trento, Italy, October 24-30, 2004.
12. Fourth International Conference on Differential and Functional Differential Equations, Moscow, August 14-21, 2005.
13. Workshop "Navier-Stokes and Turbulence", Wolfgang Pauli Institute (WPI) Vienna, Austia, April 10-14, 2006.
14. International Conference "Mathematical Hydrodynamics", Moscow, June 12-17, 2006.
15. International Conference "Geometric Methods in Nonlinear PDE's and Free Boundary Problems", St.-Petersburg, Russia, August 17-20, 2006.
16. "Parabolic and Navier-Stokes Equations", Stefan Banach Mathematical Center, Bedlewo, Poland, September 10-17, 2006.
17. International Conference "Differential Equations and Related Topics" dedicated to I.G. Petrovskii, Moscow, Russia, May 21-26, 2007.
18. International Conference "Mathematical Hydrodynamics: Euler Equations and Related Topics", St.-Petersburg, June 7-9, 2007 (member of the Organizing Committee).
19. International conference "Euler Equations: 250 Years On", Aussois, France, June 18-23, 2007.
20. International Workshop "Mathematical Aspects of Hydrodynamics", Oberwolfach, July 19-25, 2009.
21. International conference "Analysis and Computation of Incompressible Fluid Flow", University of Minnesota, February 21-26, 2010.
22. POMI-MIAN conference "Problems in the Theory of Stability and Differential Equations", St.-Petersburg, December 20-22, 2010.
23. International conference "Differential Equations and Related Topics" dedicated to outstanding mathematician I.G. Petrovskii (23-d meeting), Moscow, May 29 – June 4, 2011 (joint talk with Victor Vyalov).
24. International conference "Advances in Mathematical Analysis of PDEs", Mittag-Leffler Institute, Stokholm, Sweeden, June 9-13, 2012.
25. International Workshop "Mathematical Aspects of Hydrodynamics", Oberwolfach August 12-18, 2012.

26. International conference "Mathematical Hydrodynamics and Parabolic Equations" in honour of Vsevolod Solonnikov on the occasion of his 80th birthday, September 11-14, 2013, St. Petersburg, Russia (member of the Organizing Committee).
27. Clay Research Conference "The Navier Stokes Equations and Related Topics", University of Oxford, Oxford, UK, 29 Sep-01 Oct 2013.
28. International Conference on Recent Advances in PDEs and Applications (on occasion of Professor Hugo Beirao da Veiga's 70th birthday), Levico Terme (Trento), Italy, February 17-21, 2014.
29. Progress in Nonlinear Partial Differential Equations, Lisbon, Portugal, May 29-31, 2014.
30. 7th St.Petersburg Conference in Spectral Theory dedicated to the memory of M.Sh.Birman, St.-Petersburg, Euler Institute, July 3-6, 2015.
31. Mathematical Aspects of Hydrodynamics, Oberwolfach, Germany, August 9-16, 2015.
32. Towards regularity, Warsaw, Poland, September 7-9, 2016.
33. Vorticity, Rotation and Symmetry (IV) - Complex Fluids and the Issue of Regularity, Luminy, Marseille, France, May 8 - 12, 2017.
34. Modern Methods and Problems of Mathematical Hydrodynamics, Voronezh, Russia, May 3 - 8, 2018.
35. International Conference "PDEs and Mathematical Hydrodynamics: A conference in Honor of Vsevolod Alekseevich Solonnikov's 85'th Birthday", St.-Petersburg, Russia, July 30 - August 3, 2018 (Chairman of the Organizing Committee).
36. Modern Methods and Problems of Mathematical Hydrodynamics, Voronezh, Russia, May 3 - 8, 2019.
37. Mathematical Aspects of Hydrodynamics, Oberwolfach, Germany, August 18-24, 2019.

Visiting experience:

- CMAF/Lisbon State University (Portugal), May-July 1999, 3 months.
- Iowa State University (USA), November 1999, 2 weeks.
- Saarland University (Germany), September-October 2000, 2 months.
- Iowa State University (USA), April-May 2001, 1.5 months.
- CMAF/Lisbon State University (Portugal), October-December 2001, 2.5 months.
- Ajou University (South Korea), April-May 2002, 2 months.
- CMAF/Lisbon State University (Portugal), October-December 2002, 3 months.
- Keio University, Yokohama (Japan), May 2004, 2 weeks.
- Arizona State University (USA), October-December 2004, 2.5 months.
- Arizona State University, USA, Spring 2005 (teaching)
- Charles University, Prague (Czech Republic), February 2007, 1 month.
- Arizona State University, USA, Spring 2008 (teaching)
- Warsaw, Poland, June 2014, 3 weeks.
- Warsaw, Poland, June 2015, 1 month.
- Warsaw, Poland, September 2016, 1 month.
- TU Darmstadt, Germany, November–December 2016, 1 month.
- University of Saarland, Germany, November 2022–May 2023, 6 month (teaching)

Invited Speaker at Seminars (some of them):

- Princeton University (USA), May 3, 2001.
- Mathematical Institute of the Czech Academy of Sciences, Prague (Czech Republic), June 13, 2001.
- University of Santiago de Compostella (Spain), December 13, 2001.
- Many others.

Participation in the grants (some of them):

1. INTAS, 96-0835, Mathematical problems in nonlinear mechanics of solids and fluids, 1997-2000
2. RFBI (Russian Foundation of Basic Researches), Mathematical problems of the dynamics of a viscous incompressible fluid, 99-01-00108, 01-01-00330, 03-01-00638, 05-01-00941, 08-01-00372, 11-01-00324, 14-01-00306, 17-01-00099, 20-01-00397, 1999-2022
3. CRDF (the United States Civilian Research and Development Foundation), RU-M1-2596-ST-04, Regularity of nonlinear problems in the theory of fluids and geophysics, 2004-2006
4. Programme IRSES FLUX, Towards regularity, PIRSES-GA-2012-319012, 2013-2017
5. Grant of the Ministry of Education and Science of the Russian Federation 14.Z50.31.0037, 2017-2020

List of Publications:

1. G. Seregin, T. Shilkin, *"Some remarks on the mollification of piecewise-linear homeomorphizms"*, Zapiski nauchn. sem. POMI, **221** (1995), pp. 235–242.
2. G. Seregin, T. Shilkin, *"Regularity of minimizers of some variational problems in plasticity theory"*, (Russian) Zap. Nauchn. Sem. S.-Peterburg. Otdel. Mat. Inst. Steklov. (POMI) 243 (1997), pp. 270–298; translation in J. Math. Sci. (New York) **99** (2000), no. 1, 969–988.
3. T. Shilkin, *"Regularity up to the boundary for solutions to some boundary value problems from the theory of generalized Newtonian fluids"*, Problemy Mat. Anatiza, SPb. State Univ., **16** (1997), pp. 239–265.
4. T. Shilkin, *"On problems of the theory of generalized Newtonian fluid with dissipative pothencial of subquadratic growth"*, Problemy Mat. Anatiza, SPb. State Univ., **17** (1997), pp. 263–284.
5. L. Consiglieri, T. Shilkin, *"Regularity to stationary weak solutions in the theory of generalized Newtonian fluids with energy transfer"*, Zap. Nauchn. Sem. S.-Peterburg. Otdel. Mat. Inst. Steklov. (POMI) 271 (2000), 122–150; translation in J. Math. Sci. (N.Y.) **115** (2003), no. 6, 2771–2788.
6. T. Shilkin, *"Full interior regularity of solutions of a two-dimensional modified Navier-Stokes system"*, (Russian) Algebra i Analiz 13 (2001), no. 1, 182–221; translation in St. Petersburg Math. J. **13** (2002), no. 1, 123–148.
7. O.A. Ladyzhenskaya, T. Shilkin, *"On coercive estimates for solutions to the linear systems of the hydrodynamical type"*, Zapiski Nauchn. Seminarov of V.A. Steklov Mathematical Institute, **288** (2002), 104–133.

8. T. Shilkin, *"Partial regularity of weak solutions of the stationary 3D- Boussinesq system"*, Zapiski Nauchn. Seminarov of V.A. Steklov Mathematical Institute, **288** (2002), 256–270.
9. L. Consiglieri, J.F. Rodrigues, T. Shilkin, *"On the Navier-Stokes equations with the energy-dependent non-local viscosities"*, Zapiski Nauchnyh Seminarov of Steklov Mathematical Institute, **306** (2003), 71–91.
10. G. Seregin, T. Shilkin, V. Solonnikov, *"Boundary Partial Regularity for the Navier-Stokes Equations"*, Zapiski Nauchnyh Seminarov POMI, **310** (2004), 158–190.
11. L. Consiglieri, J.F. Rodrigues, T. Shilkin, *"A limit model for unidirectional non-Newtonian flows with nonlocal viscosity"*, Trends in partial differential equations of mathematical physics, 37–44, Progr. Nonlinear Differential Equations Appl., **61**, Birkhauser, Basel, 2005.
12. T. Shilkin, *"Classical solvability of the coupled system modelling a heat-convergent Poiseuille-type flow"*, J. Math. Fluid Mech., **7** (2005), no. 1, 72–84.
13. Hyung-Chun Lee, T. Shilkin, *"Analysis of optimal control problems for the two-dimensional thermistor system"*, SIAM J. Control Optim. **44** (2005), no. 1, 268–282.
14. A. Mahalov, B. Nicolaenko, T. Shilkin, *" $L_{3,\infty}$-solutions to the MHD equations"*, Zapiski Nauchnyh Seminarov of Steklov Mathematical Institute, **336** (2006), 112–132.
15. A. Mikhailov, T. Shilkin, *"$L_{3,\infty}$–solutions to the 3D-Navier-Stokes system in the domain with a curved boundary"*, Zapiski Nauchnyh Seminarov of Steklov Mathematical Institute, **336** (2006), 133–152.
16. N. Filonov, T. Shilkin, *On the Stokes problem with non-zero divergence*, Zapiski Nauchnyh Seminarov of Steklov Mathematical Institute, **370** (2009) 184-202.
17. T. Shilkin, V. Vyalov, *On the boundary regularity of weak solutions to the MHD system,* Zapiski Nauchnyh Seminarov of Steklov Mathematical Institute, **385** (2010) 18-53.
18. T. Shilkin, V. Vyalov, *Estimates of solutions to the perturbed Stokes system,* Zapiski Nauchnyh Seminarov of Steklov Mathematical Institute, **410** (2013) 5-24.
19. G.A. Seregin, T.N. Shilkin, *The local regularity theory for the Navier-Stokes equations near the boundary*, Proceedings of the St Petersburg Mathematical Society, **15** (2014), 219-244.
20. M. Bulicek, J. Malek, T. Shilkin, *On the regularity of two-dimensional unsteady flows of heat-conducting generalized Newtonian fluid*, Nonlinear Analysis: Real World Applications, **19** (2014) 89–104.
21. T. Shilkin, *On the local smoothness of some class of axi–symmetric solutions to the MHD equations*, Zapiski Nauchnyh Seminarov of Steklov Mathematical Institute, **459** (2017), 127–148.
22. N. Filonov, T. Shilkin, *On some properties of weak solutions to elliptic equations with divergence-free drifts*, Contemporary Mathematics, **710** (2018), 105-120.
23. G. Seregin, T. Shilkin, *Liouville-type theorems for the Navier-Stokes equations*, Russian Mathematical Surveys, **73:4** (442) (2018), 103-170.
24. M. Chernobai, T. Shilkin, *Scalar elliptic equations with a singular drift*, Complex Variables and Elliptic Equations, **67** (2022), no.1, 9-33.
25. M. Chernobai, T. Shilkin, *Elliptic equations with a singular drift from a weak Morrey space*, https://arxiv.org/abs/2208.10909.