Yulia Petrova. Curriculum Vitae

Personal Data

Name:	Petrova Yulia (Iuliia) Petrovna
Date of Birth:	29 June 1991, Ukhta, Russia (ex. USSR)
Current position:	Postdoc of Excellence, IMPA Instituto de Matematica Pura e Applicada
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Marital status:	married, no children
Last CV update:	31/10/2022

Research interests

- *Fluid dynamics*: multiphase flow in porous media, viscous/gravitational fingering phenomenon
- *Hyperbolic conservation laws*: Riemann problem, travelling and shock waves
- *Spectral theory*: asymptotics of eigenvalues for compact operators
- *Probability theory*: Gaussian processes, small ball probabilities
- *Industrial applications*: enhanced oil recovery (EOR) methods

Education

Nov 2018	PhD in Mathematics and Physics, St. Petersburg State University, Russia Supervisor: Alexander I. Nazarov. PhD thesis: «Exact L_2-small ball asymptotics for finite-dimensional perturbations of Gaussian processes» (in Russian). Short version (in Russian)
Jun 2013	MSc in Mathematics, chair of Mathematical Physics, St. Petersburg State University, Russia

Professional Experience

2021– present	Postdoc of excellence at Instituto de Matematica Pura e Applicada (IMPA) Rio de Janeiro, Brazil. Researcher at Center PI, IMPA
2017–2021	Researcher at Chebyshev laboratory, St. Petersburg State University, Russia. Participant of industrial projects with PJSC «Gazprom Neft»
2018–2021	Teaching at Department of Mathematics and Computer Science St. Petersburg State University, Russia
2014–2018	Assistant at Department of Mathematics and Information Technology St. Petersburg Academic University, Russia
2012–2015	Assistant at Institute of Physics, Nanotechnology and Telecommunications St. Petersburg Polytecnic University, Russia

Research Awards

2019	Laureat of the «Young Mathematician» prize of the St. Petersburg Mathematical Society
2018–2019	«Gazprom Neft» Scholarship
2018	Winner of 22nd Möbius Contest in nomination «Undergraduates and graduates»
2009	Euler Fellowship for undergraduate students

Recommendation letters

- Dan Marchesin, IMPA, Rio de Janeiro, Brazil (marchesi@impa.br)
- Alexander Nazarov, St. Petersburg department of PDMI, Russia (al.il.nazarov@gmail.com)
- Mikhail Lifshits, St. Petersburg State University, Russia (mikhail@lifshits.org)
- Yalchin Efendiev, Texas A&M, USA (yalchinrefendiev@gmail.com)

Research Grants

2021	Co-principal investigator of the Russian Science Foundation grant 21-11-00047: Stochastic processes and fields with application to data analysis
2019–2021	Participant of the Russian Science Foundation grant 19-71-30002: Analysis, geometry, mathematical physics and applications
2019–2020	Participant of the President grant MD-1791.2019.1: Parabolic equations describing displacement of viscous fluids in porous media and systems with hysteresis
2017–2018	Participant of Russian Science Foundation Grant 17-11-01003: Asymptotic spectral analysis: gaps, near-threshold anomalies, "invisibility" and eigenvalues
2016–2018	Participant of RFBR Grant 16-01-00258a: Approximation of stochastic processes and functionals of them
2013–2016	Participant of St. Petersburg State University Grant 6.38.670.2013: Partial Differential Equations and applications

Patent

2022	A. Groman, F. Bakharev, S. Tikhomirov, Y. Petrova, N. Rastegaev, A. Enin, K. Kalinin. Patent No. 2772808 C1 Russian Federation, IPC E21B 43/16, C09K 8/58. Method for enhanced oil recovery: No. 2021133106: Appl. 11/15/2021 : publ. May 25, 2022 / applicant Limited Liability Company "Gazpromneft-Technological Partnerships". – EDN WLGWAU

Research Papers and Preprints

1. (with F. Bakharev, A. Enin, N. Rastegaev), *Impact of dissipation ratio on vanishing viscosity solutions of the Riemann problem for chemical flooding model.* arXiv:2111.15001. Accepted to Journal of Hyperbolic Differential Equations.
2. (with F. Bakharev, A. Enin, K. Kalinin, N. Rastegaev, S. Tikhomirov) *Optimal polymer slugs injection profiles.* arXiv:2012.03114. Under consideration in a journal.
3. (with F. Bakharev, A. Enin, A. Groman, A. Kalyuzhnuk, S. Matveenko, I.Starkov, S. Tikhomirov) *Velocity of viscous fingers in miscible displacement: Comparison with analytical models.* Journal of Computational and Applied Mathematics, March 2022; doi:10.1016/j.cam.2021.113808.
4. (with S. Tikhomirov, F. Bakharev, A. Groman, A. Kalyuzhnyuk, A. Enin, K. Kalinin, N. Rastegaev) *Calculation of graded viscosity banks profile on the rear end of the polymer slug.* Paper SPE-206426-MS, SPE Russian Petroleum Technology Conference, October 2021; doi:10.2118/206426-MS.
5. *L_2-small ball asymptotics for a family of finite-dimensional perturbations of Gaussian functions.* Zapiski Nauchnykh Seminarov POMI, vol. 501. Nikitin's memorial volume, pp. 236–258, 2021. (In Russian). English version: arXiv:1905.07804.
6. (with F. Bakharev, L. Campoli, A. Enin, S. Matveenko, S. Tikhomirov, A. Yakovlev) *Numerical investigation of viscous fingering phenomenon for raw field data.* Transport in Porous Media, 2020, pp. 1–22; doi:10.1007/s11242-020-01400-5.
7. *On spectral asymptotics for a family of finite-dimensional perturbations of operators of trace class.* Doklady Math., 2018, vol. 98, №1, pp. 367–369; doi:10.1134/S1064562418050204.
8. *Exact L_2-small ball asymptotics for some Durbin processes.* Zap. nauchn. sem. POMI, 2017, vol. 466, pp. 211–233. (In Russian) Translated: Journal of Mathematical Sciences (USA), 2020, 244(5), pp. 842-857; doi:10.1007/s10958-020-04657-9.
9. *Spectral asymptotics for problems with integral constraints.* Mat. Zametki, 2017, vol. 102(3), pp. 405–414 (In Russian). Translated: Mathematical Notes, 2017, 102(3-4), pp. 369-377; doi:10.1134/S0001434617090073.
10. (with A. I. Nazarov) *The small ball asymptotics in Hilbertian norm for the Kac–Kiefer–Wolfowitz processes.* Teor. Veroyatnost. i Primenen., 2015, Volume 60, Issue 3, Pages 482–505. Translated: Theory of Probability and its Applications, 2016, 60(3), pp. 460-480; doi:10.1137/S0040585X97T987752.

Participation at Conferences & Schools

Oct 2022	Conference IMPA 70 years & International Conference on Dynamical Systems. Celebrating the 60th Birthday of Marcelo Viana, Rio de Janeiro, Brazil	
July 2022	O.A. Ladyzhenskaya centennial conference on PDE's. St. Petersburg, Russia. Online participation. "On the impact of dissipation ratio on vanishing viscosity solutions of Riemann problems for chemical flooding models"	Poster
July 2022	Hyperbolic Balance Laws & Beyond. Magdeburg, Germany	Poster
June 2022	International Conference on Hyperbolic Problems (HYP). Malaga, Spain "On admissibility criteria for contact discontinuities in Glimm-Isaacson model arising in chemical flooding"	Slides
May 2022	Workshop: Branching systems, reaction-diffusion equations and population models, Centre de recherches matematiques (CRM), Montreal. Online.	
Dec 2021	International conference "Probabilistic methods in analysis", in Sirius, Sochi, Russia. Talk: "Small ball probabilities for Gaussian processes"	Slides
Dec 2021	Workshop: "Nonlinear PDEs and Modelling", St. Petersburg, Russia. Talk: "Looking for exact mixing velocities in miscible displacement: two-tube model"	Slides
Aug 2021	InterPore2021. Brazilian Chapter.	Slides
June 2021	InterPore2021. Online conference. Talk: "Graded viscosity banks on the rear end of the polymer slug"	Slides
Aug 2019	Third ZiF Summer School "Randomness in Physics and Mathematics" From Stochastic Processes to Networks. Bielefeld, Germany "Exact L_2-small ball asymptotics for detrended Green Gaussian processes"	Poster
May 2019	Stochastic models II. Euler Institute, St. Petersburg, Russia Talk: "Exact L_2-small ball probabilities for Durbin processes"	Slides
Jan 2018	The third Indo-Russian meeting in probability and statistics. Bangalore, India Talk: "Exact small ball asymptotics in L_2-norm for finite-dimensional perturbations of Gaussian processes: spectral method"	Slides
Dec 2017	St. Petersburg winter conference on Probability Theory and Mathematical physics. PDMI-MIAN. Talk: "On exact spectral asymptotics of finite-dimensional perturbations of integral operators of trace class"	Slides
June 2017	Symposium on Probability Theory and Random Processes, St. Petersburg "Exact L_2-small ball asymptotics for perturbations of Brownian bridge"	Slides
April 2017	International conference on partial differential equations Silkroad Mathematics Center series international conferences. Beijing, China "Spectral asymptotics in some problems with integral constraints"	Poster
June 2016	Days of Diffraction-2016, St. Petersburg, Russia Talk: "Spectral asymptotics in some problems with integral constraints"	Slides
May 2016	The 2nd Russian-Indian Joint Conference in Statistics and Probability. Talk: "Small ball asymptotics for detrended Green Gaussian processes"	Slides
Sept 2015	Yu.V.Linnik Centennial Conference, St. Petersburg, Russia Talk: "The L_2-small ball asymptotics for the Kac-Kiefer-Wolfowitz processes"	
July 2015	7th St.Petersburg Conference in Spectral Theory Talk: "Asymptotics of eigenvalues for some integro-differential operators"	Slides
July 2014	Students school on PDEs and Geometric Measure Theory, CIME, Italy	

Invited talks at seminars (2021-2022)

Probability seminar at IM-UFRJ (July 2022), Seminário Luiz Adauto de Análise/EDP at IM-UFRJ (July 2022), Oberseminar "Nonlinear Dynamics" WIAS Berlin (May 2022), CeMEAI seminar at ICMC/USP in São Carlos (April 2022), Seminario das Mulheres IMPA (April 2022), Centro PI seminar at IMPA (March 2022), Applied Math/PDE Seminar UC Davis (Feb 2022), Gabriel Lame Chair Seminar organised by J.-M. Roquejoffre (Nov. 2021), Seminario de EDP e Matematica Aplicada (Oct. 2021), Colloquium of Industrial Projects at Chebyshev Laboratory (May 2021)

Teaching Experience

Spring 2021	Problem solving classes, calculus of variations for mathematicians Faculty of Mathematics and Computer Science St. Petersburg State University	Materials (rus)	Students reviews
Fall 2020	Problem solving classes, probability theory for mathematicians Faculty of Mathematics and Computer Science St. Petersburg State University	Materials (rus)	Students reviews
Spring 2020	Problem solving classes, complex analysis Faculty of Mathematics and Computer Science St. Petersburg State University	Materials (rus)	Students reviews
2018-2019	Problem solving classes, calculus (I, II, III, IV semesters) Faculty of Mathematics and Computer Science St. Petersburg State University	Materials (rus)	Students reviews
Jan 2019	Lecturer of the course «Random walks» in Educational Program in mathematics and computer science at «Sirius», Sochi, Russia		
Nov 2019	Assistant to the course «Dynamical systems» in COMSATS University Islamabad, Lahore Campus, Pakistan. ICTP-CUI Visiting Scholars Program for Training and Research in Math		
2014–2018	Problem solving classes, calculus (I, II, III, IV semesters) for physicists. St. Petersburg Academic University	Materials III, IV	
2012–2014	Problem solving classes, PDEs for physicists St. Petersburg Polytecnic University		
2012–2017	Teaching *olimpiad mathematics* in "Formulo de Integreco", International educational center for gifted high-school students. I participated in 7 winter and summer Russian and international camps. Also from 2014 till 2017 taught online courses in olimpiad maths for school students from non-capital regions of Russia	Materials from the camp	

Additional experience

Organizational:	• co-organiser of seminar "Applied and Computational Mathematics" at IMPA • co-organiser of the seminar «Industrial Mathematics» from Feb 2019 till Feb 2022 at Chebyshev Laboratory, St. Petersburg, Russia. See also YouTube
Industrial:	I was a part of a long-term industrial project in Chebyshev Laboratory on Enhanced Oil Recovery (EOR) methods jointly with petroleum company «Gazprom Neft» in 2018–2021 in St. Petersburg, Russia
Teamwork:	I have experience working in a team of 13 people (2 professors, 6 mathematicians from students to postdocs, 3 numerical modellists, 1 chemist, 1 physicist) and leading a subproject of 5 people. Usually I am the leader of the group of 2-3 people
Programming:	COMSOL Multiphysics, Matlab, Git, basics of Python. Among numerical methods I worked with FEM, FVM, FDM
Adaptivity:	I easily adapt to different countries. I have been to almost all European countries, India, China, Pakistan, Egypt, Mexico. Now I am a postdoc in Brazil
Olympiads:	At school I frequently was the winner of town olympiads in maths, physics, chemistry and informatics. Several times I was the winner of math olympiad of republic level. I was actively teaching olympiad mathematics during my university studies
Thesis committee:	I was in a thesis committee of Júlia Domingues Lemos (IMPA, October 2022)

Languages

Russian:	Native speaker
English:	Fluent
Portuguese:	Proficient. Avançado superior na preparação Celpe-Bras, October 2022
Spanish:	Proficient. Intermediate talking, proficient reading and writing