ALEXANDER OSINSKY

PhD student - defense in October 2022

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EXPERIENCE

Junior Research Scientist

Skoltech

September 2019 – present

- Channel estimation for massive MIMO: theoretical bounds, subspace selection with a-priory information, suppression of external interference.
- Turbo channel estimation based on least squares estimate of the a-posteriory bit error rates.
- Huawei project on stable MMSE detector construction with half precision arithmetic (ongoing).

Research Intern

Skoltech

March 2019 – September 2019

- Huawei project on channel estimation in 5G.

Junior Research Scientist

Marchuk institute of numerical mathematics (INM RAS)

April 2018 – December 2018

- Matrix completion and probabilistic cross methods accuracy estimates.

EDUCATION

PhD student, computational and data science

Skoltech

November 2022 – October 2022

- Molecular dynamics modeling of fragmentation.
- Asymptotic analysis of temperature-dependent aggregation. Acceleration of ODE solutions, fast Monte-Carlo algorithms for granular gases simulation.

Master of Science, applied mathematics

Moscow institute of physics and technology (MIPT)

September 2016 – June 2018 5/5 GPA

- New fast low-rank approximation algorithms and their analysis. Построение и анализ быстрых алгоритмов малоранговой аппроксимации, обобщение части оценок на тензорные поезда. Some estimates generalized to tensor trains.
- Huawei project on efficient FIR filter construction.

Bachelor of Science, applied mathematics and physics

Moscow institute of physics and technology (MIPT)

September 2012 – June 2016 4.98/5 GPA

- Thesis: new accuracy estimates of pseudosckeleton matrix approximations.

AREAS OF INTEREST

- Matrix and tensor analysis;
- Computational linear algebra;
- Mathematical modeling.

PROGRAMMING

Fortran | Mathematica | Matlab | Python | C

SOFTWARE PACKAGES

BLAS/LAPACK/MKL | OpenMP | LAMMPS

AWARDS

- Gold medal of the Russian Academy of Sciences for best student work in Mathematics 2018
- MIPT conference winner diploma 2015, 2016

GRANTS

- RSF 21-11-00363: Development of a model for predicting atmospheric pollution by solid phase particles using artificial intelligence 2021-2023
- RSF 21-11-00373: Mathematical methods of deep learning 2021-2023
- RFBR 20-31-90022: Elaboration of effective solvers for generalized Smoluchowski equations 2020-2022
- RSF 14-11-00806: Algebraic methods of approximation and optimization 2016-2018

COMPLEMENTARY EDUCATION

Computing technologies, multidimensional data analysis and modeling

Sirius University

August 2021

RECENT PUBLICATIONS

Journal Articles

- Kalinov, A. et al. (2021). “Machine Learning-Assisted PAPR Reduction in Massive MIMO”. in: *IEEE Wireless Communications Letters* 10.3, pp. 537–541. DOI: 10.1109/LWC.2020.3036909.
- Lebedeva, O., A. Osinsky, and S. Petrov (2021). “Low-rank approximation algorithms for matrix completion with random sampling”. In: *Computational Mathematics and Mathematical Physics* 61, pp. 799–815. DOI: 10.1134/S0965542521050122.
- Osinsky, A., A. Ivanov, D. Lakontsev, et al. (2021). “Lower performance bound for beamspace channel estimation in Massive MIMO”. in: *IEEE Wireless Communications Letters* 10.2, pp. 311–314. DOI: 10.1109/LWC.2020.3029678.
- Osinsky, A., A. Ivanov, and D. Yarotsky (2021a). “Efficient performance bound for channel estimation in massive MIMO receiver”. In: *IEEE Transactions on Wireless Communications* 20.11, pp. 7001–7010. DOI: 10.1109/TWC.2021.3079632.
- Zamarashkin, N. and A. Osinsky (2021). “On the accuracy of cross and column low-rank maxvol approximations in average”. In: *Computational Mathematics and Mathematical Physics* 61, pp. 786–798. DOI: 10.1134/S0965542521050171.
- Bodrova, A., A. Osinsky, and N. Brilliantov (2020). “Temperature distribution in driven granular mixtures does not depend on mechanism of energy dissipation”. In: *Scientific Reports* 10, p. 693. DOI: 10.1038/s41598-020-57420-0.
- Brilliantov, N., A. Osinsky, and P. Krapivsky (2020). “Role of energy in ballistic agglomeration”. In: *Physical Review E* 102.4, p. 042909. DOI: 10.1103/PhysRevE.102.042909.
- Osinsky, A. (2020). “Low-rank method for fast solution of generalized Smoluchowski equations”. In: *Journal of Computational Physics* 422, p. 109764. DOI: 10.1016/j.jcp.2020.109764.
- Osinsky, A., A. Bodrova, and N. Brilliantov (2020). “Size-polydisperse dust in molecular gas: Energy equipartition versus nonequipartition”. In: *Physical Review E* 101 (2), p. 022903. DOI: 10.1103/PhysRevE.101.022903.
- Osinsky, A., A. Ivanov, and D. Yarotsky (2020). “Bayesian approach to channel interpolation in massive MIMO receiver”. In: *IEEE Communications Letters* 24.12, pp. 2751–2755. DOI: 10.1109/LCOMM.2020.3018541.

Conference Proceedings

- Bychkov, R. et al. (2021). “Data-driven beams selection for beamspace channel estimation in massive MIMO”. in: *2021 IEEE 93rd Vehicular Technology Conference (VTC2021-Spring)*, pp. 1–5. DOI: 10.1109/VTC2021-Spring51267.2021.9448633.
- Osinsky, A., R. Bychkov, et al. (2021). “Adaptive channel interpolation in high-speed massive MIMO”. in: *2021 IEEE 93rd Vehicular Technology Conference (VTC2021-Spring)*, pp. 1–5. DOI: 10.1109/VTC2021-Spring51267.2021.9448939.
- Osinsky, A., A. Ivanov, and D. Yarotsky (2021b). “Spatial denoising for sparse channel estimation in coherent massive MIMO”. in: *2021 IEEE 94th Vehicular Technology Conference (VTC2021-Fall)*, pp. 1–5. DOI: 10.1109/VTC2021-Fall52928.2021.9625153.
- Yarotsky, D. et al. (2021). “Machine learning-assisted channel estimation in massive MIMO receiver”. In: *2021 IEEE 93rd Vehicular Technology Conference (VTC2021-Spring)*, pp. 1–5. DOI: 10.1109/VTC2021-Spring51267.2021.9448862.

TEACHING EXPERIENCE (SEMINARS)

Machine learning for wireless communications

Skoltech

April – May 2021

Foundations of multiscale modeling: kinetics

Skoltech

February – March 2021

Theoretical methods of deep learning

Skoltech

October – December 2020

Discrete analysis (ALCGT)

MIPT

September – December 2016, 2017

SCIENTIFIC ADVISOR

Prof. Nikolay Brilliantov
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