Abdurakhmon Sadiev

Personal Data

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Research Interests

Stochastic Optimization, Variational Inequalities, Machine Learning, Federated Learning

Education

Sept. 2022 - Present	PhD in Computer Science **King Abdullah University of Science and Technology**, Thuwal, Saudi Arabia Advisor: Peter Richtárik
Sept. 2020 - July 2022	MS in Applied Mathematics and Physics **Moscow Institute of Physics and Technology**, Moscow, Russia Advisor: Alexander Gasnikov
Sept. 2016 - July 2020	BS in Applied Mathematics and Physics **Moscow Institute of Physics and Technology**, Moscow, Russia Advisor: Alexander Gasnikov

Work Experience

July 2021 - July 2022	Junior Researcher at the Laboratory of Advanced Combinatorics and Network Applications, *Moscow Institute of Physics and Technology*, Russia
September 2020 - July 2022	Teaching assistant at the Department of Advanced Mathematics, *Moscow Institute of Physics and Technology*, Russia Duties: teach **Functional Analysis**, **Calculus**
September 2020 - July 2022	Teaching assistant at the Department of Mathematical Fundamentals of Control *Moscow Institute of Physics and Technology*, Russia Duties: teach **Methods of Optimal Control**

Publications and Preprints

17. A. Karagulyan, E. Shulgin, **A. Sadiev** and P. Richtárik
SPAM: Stochastic Proximal Point Method with Momentum Variance Reduction for Non-convex Cross-Device Federated Learning
arXiv preprint: arXiv:2405.20127
Status: Under review

16. P. Richtárik, **A. Sadiev** and Y. Demidovich
A Unified Theory of Stochastic Proximal Point Methods without Smoothness
arXiv preprint: arXiv:2405.15941
Status: Under review

15. **A. Sadiev**, L. Condat and P. Richtárik
Stochastic Proximal Point Methods for Monotone Inclusions under Expected Similarity
arXiv preprint: arXiv:2405.14255
Status: Under review

14. E. Gorbunov, **A. Sadiev**, M. Danilova, S. Horváth, G. Gidel, P. Dvurechensky, A. Gasnikov and P. Richtárik
High-Probability Convergence for Composite and Distributed Stochastic Minimization and Variational Inequalities with Heavy-Tailed Noise

arXiv preprint: arXiv:2310.01860
Status: Accepted to ICML 2024

13. **A. Sadiev**, M. Danilova, E. Gorbunov, S. Horváth, G. Gidel, P. Dvurechensky, A. Gasnikov and P. Richtárik
High-Probability Bounds for Stochastic Optimization and Variational Inequalities: the Case of Unbounded Variance
arXiv preprint: arXiv:2302.00999
Status: Accepted to ICML 2023

12. M. Makarenko, E. Gasanov, R. Islamov, **A. Sadiev** and P. Richtárik
Adaptive Compression for Communication-Efficient Distributed Training
arXiv preprint: arXiv:2211.00188
Status: Published in TMLR

11. **A. Sadiev**, D. Kovalev and P. Richtárik
Communication Acceleration of Local Gradient Methods via an Accelerated Primal-Dual Algorithm with Inexact Prox
arXiv preprint: arXiv:2207.03957
Status: Accepted to NeurIPS 2022

10. **A. Sadiev**, G. Malinovsky, E. Gorbunov, I. Sokolov, A. Khaled, K. Burlachenko and P. Richtárik
Federated Optimization Algorithms with Random Reshuffling and Gradient Compression
arXiv preprint: arXiv:2206.07021
Workshop on Federated Learning and Analytics in Practice: Algorithms, Systems, Applications, and Opportunities (ICML 2023)
Status: Under review

9. **A. Sadiev**, A. Beznosikov, A.J. Almansoori, D. Kamzolov, R. Tappenden and M. Takác
Stochastic Gradient Methods with Preconditioned Updates
arXiv preprint: arXiv:2206.00285
Status: Published in JOTA

8. M. Alkousa, A. Gasnikov, P. Dvurechensky, **A. Sadiev** and L. Razouk
An Approach for Non-convex Uniformly Concave Structured Saddle Point Problem
arXiv preprint: arXiv:2202.06376
Status: Spell out CRM

7. D. Kovalev, A. Beznosikov, **A. Sadiev**, M. Persiianov, P. Richtárik and A. Gasnikov
Optimal Algorithms for Decentralized Stochastic Variational Inequalities
arXiv preprint: arXiv:2202.02771
Status: Accepted to NeurIPS 2022

6. Z. Shi, **A. Sadiev**, N. Loizou, P. Richtárik and M. Takác
AI-SARAH: Adaptive and Implicit Stochastic Recursive Gradient Methods
arXiv preprint: arXiv:2102.09700
Status: Published in TMLR

5. **A. Sadiev**, E. Borodich, A. Beznosikov, D. Dvinskikh, S. Chezhegov, R. Tappenden, M. Takác and A. Gasnikov
Decentralized Personalized Federated Learning: Lower Bounds and Optimal Algorithm for All Personalization Modes
arXiv preprint: arXiv:2107.07190
Spotlight at Workshop on Optimization for Machine Learning (NeurIPS 2021)
Status: Published in EURO Journal on Computational Optimization

4. E. Borodich, A. Beznosikov, **A. Sadiev**, V. Sushko, N. Savelyev, M. Takác and A. Gasnikov
Decentralized Personalized Federated Min-Max Problems

arXiv preprint: arXiv:2106.07289
Workshop on New Frontiers in Federated Learning: Privacy, Fairness, Robustness, Personalization and Data Ownership (NeurIPS 2021)
Status: Under review

3. E. Gladin, **A. Sadiev**, A. Gasnikov, P. Dvurechensky, A. Beznosikov and M. Alkousa
Solving Smooth Min-Min and Min-Max Problems by Mixed Oracle Algorithms
arXiv preprint: arXiv:2103.00434
Status: Accepted to MOTOR-2021, published in Communications in Computer and Information Science (CCIS) series

2. **A. Sadiev**, A. Beznosikov, P. Dvurechensky and A. Gasnikov
Zeroth-Order Algorithms for Smooth Saddle-Point Problems
arXiv preprint: arXiv:2009.09908
Status: Accepted to MOTOR-2021, published in Communications in Computer and Information Science (CCIS) series

1. A. Beznosikov, **A. Sadiev** and A. Gasnikov
Gradient-Free Methods for Saddle-Point Problem
arXiv preprint: arXiv:2005.05913
Status: Accepted to MOTOR-2020, published in Communications in Computer and Information Science (CCIS) series

Research Visiting

- **April 2022**: MBZUAI, Abu Dhabi, United Arab Emirates (worked with Martin Takác)
- **February – July 2022**: KAUST, Thuwal, Kingdom of Saudi Arabia (worked with Peter Richtárik)
- **October – November 2021**: MBZUAI, Abu Dhabi, United Arab Emirates (worked with Martin Takác)

Conference Presentations

- **July 2-8, 2023**: Third international conference "Mathematics in Armenia: Advances and Perspectives", Yerevan, Armenia
Talk: *High-Probability Bounds for Stochastic Optimization and Variational Inequalities: the Case of Unbounded Variance*
- **December 13-14, 2021**: Iternational OPT Workshop on Optimization for Machine Learning, NeurIPS 2021
Talk & Poster: *Decentralized Personalized Federated Learning: Lower Bounds and Optimal Algorithm for All Personalization Modes*
- **July 12-18, 2021**: Conference "Optimization without Borders"
Poster: *Zeroth-Order Algorithms for Smooth Saddle-Point Problems*, Sochi, Russia
- **July 5-10, 2021**: International conference on "Mathematical Optimization Theory and Operations Research" MOTOR-2021, Irkutsk, Russia
Talk: *Zeroth-Order Algorithms for Smooth Saddle-Point Problems*
- **July 6-11, 2020**: International conference on "Mathematical Optimization Theory and Operations Research" MOTOR-2020, Novosibirsk, Russia
Talk: *Gradient-Free Methods for Saddle-Point Problem*

Awards & Scholarships

- **August 2023**: Dean's List Award, KAUST
- **September 2022 - September 2025**: KAUST Discovery Doctoral Fellowship (KDDF), KAUST
- **September 2022 - September 2025**: Dean's Award, KAUST

- **July 2022**: Outstanding Reviewer Award at ICML 2022
- **September - December 2021**: Increased State Academic Scholarship for 4th year bachelor and master students at MIPT
- **September - December 2021**: 2nd degree prof. Andrei Raigorodskii personal scholarship for contributions to the development of numerical optimization methods
- **February - June 2021**: 3rd degree prof. Andrei Raigorodskii personal scholarship for contributions to the development of numerical optimization methods
- **September - December 2020**: Increased State Academic Scholarship for 4th year bachelor and master students at MIPT
- **September - December 2018**: Abramov scholarship for 1-3 year bachelor students with the best grades at MIPT
- **February - June 2018**: Abramov scholarship for 1-3 year bachelor students with the best grades at MIPT

Summer Schools

- **July 2023**: Summer School on Statistics and Learning Theory, Tsaghkadzor, Armenia
- **July-August 2021**: Summer School on "Modern Methods of Information Theory, Optimization and Control Theory", *Sirius University of Science and Technology*, Sochi, Russia
- **June 2021**: Summer School on "Control, Information and Optimization", Voronovo, Russia
- **August 2020**: Summer School on "Control, Information and Optimization", *Sirius University of Science and Technology*, Sochi, Russia
- **August 2020**: Summer School on "Modern Methods of Information Theory, Optimization and Control Theory", *Sirius University of Science and Technology*, Sochi, Russia

Computer Skills

Operating Systems:	Mac OSX, Microsoft Windows, Linux
Programming Languages:	Python, LaTeX, C, C++
Python Libraries:	Pandas, NumPy, Matplotlib, Scikit-Learn, SciPy, Pytorch, CVXPY

Reviewing

- NeurIPS 2023: 6 papers
- NeurIPS 2022: 2 papers
- ICML 2022: 2 papers

Languages

Russian:	Native speaker
English:	Advanced

Other Interests

Chess: 5 years in chess school in Moscow, Russia. Now I am playing chess online. Theater: 4 years in school theater.