Daria Sushnikova

Date of birth: February 6, 1991
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Education

2023 **Higher Education Teaching Certificate**, *Harvard's Derek Bok Center for Teaching and Learning, Cambridge, USA*, grade: 94/100.

2013–2017 **PhD in Mathematical modeling, numerical methods and software packages (05.13.18)**, *awarded by the dissertation committee D 002.045.01 of the Institute of Numerical Mathematics of the Russian Academy of Sciences*, Moscow, Russia, Supervisor: Prof. Ivan Oseledets.

2008–2013 **Specialist in Mathematics and System Programming**, *Lomonosov Moscow State University*, Moscow, Russia, Supervisor: Prof. Ivan Oseledets.

Employment

2022–pres. Postdoctoral Associate, King Abdullah University of Science and Technology, Thuwal, Kingdom of Saudi Arabia

2021–2022 Associate Professor, Department of Computational Science, Higher School of Economics, Moscow, Russia.

2019–2021 Postdoctoral Associate, Courant Institute of Mathematical Sciences, New York University, New York, NY, United States

2017–2019 Research Scientist, Skolkovo Institute of Science and Technology, Moscow, Russia.

2012–2016 Out-of-staff Researcher, Institute of Numerical Mathematics of Russian Academy of Sciences, Moscow, Russia

Publications

2024 **"Multidimensional deconvolution with shared bases"**, *Sushnikova, D., Ravasi, M., Keyes, D.*, arXiv preprint arXiv:2404.01870.

2023 **"FMM-LU: A fast direct solver for multiscale boundary integral equations in three dimensions"**, *Sushnikova, D., Greengard, L., O'Neil, M., & Rachh, M.*, SIAM: Multiscale Modeling and Simulation, T. 21, No. 4, C. 1570-1601.

2020 **"Simple non-extensive sparsification of the hierarchical matrices"**, *Sushnikova, D., Oseledets, I.*, Adv Comput Math, T. 46. C. 52.

2018 **"Compress and eliminate solver for symmetric positive definite sparse matrices"** , *Sushnikova, D., Oseledets, I.*, SIAM J. Sci. Comput., T. 40, No. 3, C. A1742-A1762.

2017 **"Application of block low-rank matrices in Gaussian processes for regression"**, *Sushnikova, D.*, Computational Methods and Programing, No. 18, P. 214-220 (in Russian).

2016 **"Preconditioners for hierarchical matrices based on their extended sparse form"**, *Sushnikova, D., Oseledets, I.*, Russ. J. Numer. Anal. Math. Modelling, No. 1, P. 29-40.

2015 **"Numerical solution of diffraction problems using large matrix compression"**, *Ryzhakov, G., Mikhalev, A., Sushnikova, D., Oseledets, I.*, 9th European Conference on Antennas and Propagation (EuCAP), P. 1-3.

Peer reviews

2024 Journal of computational physics, ISSN: 0021-9991

2022 SIAM journal on scientific computing, ISSN: 1095-7197

Selected Conference Presentations

Jan 2024 "Multidimensional Deconvolution with an $\mathcal{H}^2$-like parameterization", 28th International Conference on Domain Decomposition, King Abdullah University of Science and Technology, Saudi Arabia

Oct 2021 "Direct Solution of Systems with Rank-Structured Matrices", Conference on Fast Direct Solvers, Purdue University, USA

Now 2016 "Compress and Eliminate Solver for Sparse and Block Low-Rank Matrices", Workshop on Fast Direct Solvers, Purdue University, USA

May 2016 "Fast direct block low-rank sparse solver", Scalable Hierarchical Algorithms for eXtreme Computing workshop, King Abdullah University of Science and Technology, Saudi Arabia

Aug 2015 "Fast block low-rank direct solvers for sparse matrices", 4th International Conference on Matrix Methods in Mathematics and Applications, Skolkovo Institute of Science and Technology, Moscow

Jun 2015 "Fast block low-rank direct solvers for sparse matrices" (poster), Workshop: Lowrank Optimization and Applications, Hausdorff Center for Mathematics, Bonn, Germany

Jun 2014 "Preconditioning large dense matrices with $\mathcal{H}^2$-structure using equivalent sparse form" (poster), Fast Direct Solvers for Elliptic PDEs, Dartmouth College, USA

Selected Teaching Experience

2021 Assistant Professor, course "Matrix computations", Higher School of Economics, Moscow, Russia

2016 Teaching assistant at the course "Numerical Methods for PDE" by Prof. Alexander Shapeev, Skolkovo Institute of Science and Technology, Moscow, Russia

2015 Teaching assistant at the course "Numerical linear algebra" by Prof. Ivan Oseledets, Skolkovo Institute of Science and Technology, Moscow, Russia

2015 Teaching assistant at the course "Fast PDE" by Prof. Ivan Oseledets, Skolkovo Institute of Science and Technology, Moscow, Russia

2014 Teaching assistant at the course "Great Computational Methods" by Prof. Luca Daniel, Skolkovo Institute of Science and Technology, Moscow, Russia

Leadership & Volunteer Experience

2024 Volunteer, 28th International Conference on Domain Decomposition, KAUST, Thuwal, Saudi Arabia

2024 Scientific Advisor for Bachelor's Thesis Research, KAUST, Thuwal, Saudi Arabia

2021 Coordinator of Freshman Year, Computer Science Department, Higher School of Economics, Moscow, Russia

Languages

Russian (native language)

English (fluent)

Computer skills

Python, Fortran, MPI, LaTeX, Git, UNIX

Projects on scientific computing

FMM-LU solver

Compress and eliminate solver

Non-extensive sparsification of the hierarchical matrices

h2tools (contributor)

Research interests

Numerical analysis, data analysis, linear algebra, scientific computing, numerical methods for integral equations and PDEs, hierarchical matrices, rank-structured matrices

Links

Personal Page

ORCID

Scopus Author ID

Google Scholar

GitHub

Grants & Awards

2024 Winner of the “Best Poster Prize DD28”

2020 Winner of the “Rising Stars 2020 in Computational & Data Sciences”

2008 Winner of the “Russian Young Physicists Tournament”