Anna Yesypenko

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Positions

Assistant Professor of Mathematics **August 2025 - Current**
The Ohio State University

Postdoctoral Fellow **Jan 2024 - August 2025**
Oden Institute, University of Texas at Austin
Supervised by George Biros

Education

University of Texas at Austin **Sep 2017 - Dec 2023**
PhD in Computational Science, Engineering, and Mathematics
Msc in Computational Science, Engineering, and Mathematics
Advisor: Per-Gunnar Martinsson, Co-advisor: George Biros

Cornell University **Sep 2013 - May 2017**
Bachelor's of Science in Engineering, magna cum laude
Major: Computer Science

Teaching

Math 7611: Computational PDEs I **Fall 2025**

Fellowships

CSEM Fellowship, The University of Texas at Austin. **Sep 2017 - Aug 2021**

Preprints

[1] Simon Dirckx, Anna Yesypenko, and Per-Gunnar Martinsson. "A fast spectral overlapping domain decomposition method with discretization-independent conditioning bounds". In: (2025). arXiv: 2510.25991 [math.NA].

[2] Joseph Kump, Anna Yesypenko, and Per-Gunnar Martinsson. "A Two-Level Direct Solver for the Hierarchical Poincare-Steklov Method". In: (2025). arXiv: 2503.04033 [math.NA].

[3] Katherine J. Pearce, Anna Yesypenko, James Levitt, and Per-Gunnar Martinsson. "Randomized Rank-Structured Matrix Compression by Tagging". In: (2025). arXiv: 2501.05528 [math.NA].

[4] Anna Yesypenko and Per-Gunnar Martinsson. "Randomized Strong Recursive Skeletonization: Simultaneous Compression and LU Factorization of Hierarchical Matrices using Matrix-Vector Products". In: (2023). Submitted to *Journal of Scientific Computing*. arXiv: 2311.01451 [math.NA].

Publications

[5] Anna Yesypenko, Chao Chen, and Per-Gunnar Martinsson. "A simplified fast multipole method based on strong recursive skeletonization". In: *Journal of Computational Physics* 524 (2025), p. 113707.

[6] Anna Yesypenko and Per-Gunnar Martinsson. "SlabLU: a two-level sparse direct solver for elliptic PDEs". In: *Advances in Computational Mathematics* 50.4 (2024), p. 90.

[7] Anna Yesypenko and Per-Gunnar Martinsson. "GPU optimizations for the hierarchical Poincare-Steklov scheme". In: *International Conference on Domain Decomposition Methods*. Springer. 2022, pp. 519–528.

[8] Benjamin C Revard, William W Tipton, Anna Yesypenko, and Richard G Hennig. "Grand-canonical evolutionary algorithm for the prediction of two-dimensional materials". In: *Physical Review B* 93.5 (2016), p. 054117.

Thesis

[9] Anna Yesypenko. "Randomized algorithms for the efficient solution of elliptic PDEs on modern architectures". PhD thesis. University of Texas at Austin, 2023.

Invited Talks

Householder Symposium (plenary talk).
8-13 June 2025.

Babuška Forum at Oden Institute.
"Fast Randomized Solvers for Complex Physical Systems". 18 April 2025.

SIAM Conference on Computational Science and Engineering.
"Advances in Domain Decomposition Methods and Fast Solvers" (organizer).
3-7 March 2025.

Computational Tools for PDEs with Complicated Geometries and Interfaces at Flatiron Institute.
"An Introduction to the Hierarchical Poincare-Steklov Method".
10-14 June 2024.

Copper Mountain Conference. 14-19 April 2024.

International Congress on Industrial and Applied Mathematics.
20-25 August 2023.

SIAM Annual Conference. 11-15 July 2022.

SIAM CSE Conference. 1-5 March 2021.

Workshops

Rising Stars in Computational and Data Sciences.
Austin, Texas. 12-13 April 2023.

Challenges in Computational Methods for Integral Equations.
Oaxaca, Mexico. 22-27 May 2022.

Gene Golub SIAM Summer School in Data Science.
Aussois, France. 17-28 June 2019.

Oberwolfach Seminar in Numerical Homogenization.
Oberwolfach, Germany. 09-15 June 2019..

Involvement and Outreach

Program Committee Member **Mar 2026**
Algorithms & Performance area/track for ISC High Performance 2026.

Host of Babuška Forum **March 2021 - June 2022**
The Babuška Forum series was started by Professor Ivo Babuška several years ago to expose students to interesting and curious topics relevant to computational engineering and science with technical content at the graduate student level.

Reviewer · National Science Foundation · Journal of Computational Physics · SIAM Journal of Matrix Analysis and Applications · Communications on Pure and Applied Mathematics · Applied and Computational Harmonic Analysis · Computers and Mathematics with Applications · International Journal of High Performance Computing Applications

Mentorship

Research mentor **Jan 2024 - Current**
Joseph Kump in CSEM PhD program. Paper on arXiV (listed above).

Directed Reading Program Mentor **Sep 2018 - May 2019**
Mentored undergraduate students in a computational research project.
Multiplying Polynomials via the FFT - Elizabeth Taber
Interpretable Matrix Decomposition - Emily Tallman

Software

[10] Anna Yesypenko. *SkelFMM: A Simplified Kernel-Independent Fast Multipole Method in Python*. Version 1.0.0. Jan. 2025. DOI: 10.5281/zenodo.14613533. URL: https://github.com/annayesy/skelFMM.

[11] Anna Yesypenko. *SlabLU: A Two-Level Sparse Direct Solver for Elliptic PDEs in Python*. Version 1.0.1. May 2024. DOI: 10.5281/zenodo.11238664. URL: https://github.com/annayesy/slabLU.

[12] Anna Yesypenko. *SimpleOctree in Python*. Version v1.0.1. Jan. 2025. DOI: 10.5281/zenodo.14613403. URL: https://github.com/annayesy/simpleoctree/.

References

Per-Gunnar Martinsson
W. A. "Tex" Moncrief, Jr. Endowment in Simulation-Based Engineering and Sciences
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