Amit Rotem

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Programming: C++20, Python, CUDA, MPI, OpenMP
Interests: high performance scientific computing, mathematical modeling, partial differential equations.

Education

Virginia Tech, Blacksburg, VA — *Ph.D. Mathematics, Expected 2026*
GPA: 3.9

Colorado School of Mines, Golden, CO — *M.S. Computational & Applied Mathematics, 2021*
GPA: 4.0

Colorado School of Mines, Golden, CO — *B.S. Applied Mathematics & Statistics, 2020*
GPA: 3.6

Technical Skills

Languages	C++20 (and newer), Python, MATLAB
Computation	CUDA, MPI, OpenMP
Numerics	High-order finite elements, iterative methods, domain decomposition, low-rank methods
Tools	Linux, Git, CMake, profiling/optimization, distributed computing systems

Projects & Experience

Lawrence Livermore National Laboratory — Computing Scholar Summer 2024

- Devised matrix-free methods (C++/CUDA) targeting high dimensional physics simulations.
- Implemented templated GPU kernels supporting configurable memory/thread layouts.
- Code: https://github.com/GenDiL/GenDiL

High-Performance Discontinuous Galerkin (DG) in MFEM Library 2023–Present

- Integrated interior penalty DG in 2D/3D with GPU-optimized matrix-free algorithms.
- Achieved substantial speedups relative to existing matrix-based MFEM implementations.
- Code: https://github.com/mfem/mfem

Ph.D. Research — Virginia Tech 2021–Present

- Developed theory and practical implementations of the WaveHoltz iterative Helmholtz solver.
- Extended multiscale variant for homogenization.
- Built scalable domain-decomposition and multigrid accelerated variants.
- Formulated fast low-rank reduced order models for the Navier Stokes equations.

CASERM (NSF IUCRC) 2019–2021

- Built ML pipelines for hyperspectral geological imaging: segmentation, clustering, classification.
- Constructed predictive models in TensorFlow and scikit-learn.

Selected Publications

- Rotem A., Runborg O., Appelö D. *Convergence of the Semi-Discrete WaveHoltz Iteration*.
- Carter S., Rotem A., Walker S. *A Domain Decomposition Approach for Nematic Liquid Crystal Models*. *J. Non-Newtonian Fluid Mechanics*, 2020.
- Rotem A. et al. *Interpretation of Hyperspectral SWIR Core Scanning Data Using ML*. *Geosciences*, 2023.

Awards

- Best Poster at SIAM Central States, 2024.
- Professor Everett Award (mathematical contributions to geological sciences) at Colorado School of Mines, 2021.