ALEXEY VORONIN

5lexey.voronin@gmail.com ⋄ (312) · 612 · 0299

EDUCATION

University of Illinois at Urbana-Champaign Champaign-Urbana, Illinois, USA
Doctor of Philosophy (Ph.D.) in Computer Science *August 2018 - Present*
Advisor: Luke Olson
· Research Area: Numerical Linear Solvers for Systems of PDEs
· Current GPA: 3.91/4.0

University of California, San Diego La Jolla, California, USA
Bachelor of Science (B.S.) *September 2010 - June 2015*
· Graduated with a double major in Applied Mathematics and Computational Physics

Argonne Training Program on Extreme-Scale Computing (ATPESC) *August 2017*
High-Performance Computing (HPC) training program for early-career computational scientists

EXPERIENCE

Scientific Computing Group Dept. of Computer Science, UIUC *August 2018 - Present*
Graduate Research Assistantship *Urbana, IL*
· Developing multilevel methods for solution of the discrete saddle point systems arising from mixed
finite-element discretization of the incompressible Navier-Stokes equations
   - Supervisors: Luke Olson, Scott MacLachlan
   - Research Areas: Algebraic Multigrid, Systems of PDEs, Mixed-finite element methods

Sandia National Laboratories, Center for Computing Research *Summer 2020 & 2021*
Graduate Student Intern *Livermore, CA*
· Investigated novel algebraic multigrid coarsening approaches for problems with coupled fields such as
Stokes equations
   - Supervisor: Raymond Tuminaro

Lawrence Livermore National Laboratory, CASC *May 2018 - August 2018*
Computer Scientist in Computation Division, CASC *Livermore, CA*
· Explored alternative approaches to forming multigrid components in order to decrease the overall setup
costs for the non-linear time-dependent systems
   - Supervisor: Ulrike Meier Yang
   - Research Areas: Algebraic Multigrid, HYPRE

Lawrence Livermore National Laboratory, Computation Division *July 2015 - August 2018*
Computer Scientist in Application Simulation, and Quality Group *Livermore, CA*
· Optimised Hybrid MPICH/OpenMP particle-in-cell (PIC) plasma code used by LLNLs physics groups
   - Supervisor: Andrea Schmidt
   - Research Areas: Scalability, Load Balancing, Preconditioned Krylov Methods
· Helped develop the Livermore Design Optimization (LiDO) code, based on Modular Finite Element
Discretization (MFEM) Library
   - Supervisor: Daniel White and Daniel Tortorelli
   - Research Areas: Matrix-free solvers, CUDA, Emerging Architectures, Topology Optimization

Skaggs School of Pharmacy and Pharmaceutical Sciences   *June 2012 - June 2014*
Undergraduate Researcher   *La Jolla, CA*

· Co-developed a new molecular dynamics approach to answer whether the shifts in electron density induced by external charges are best replicated by changes in atom-centered charges, or by addition of atom-centered dipoles

TEACHING EXPERIENCE

University of Illinois at Urbana-Champaign

Graduate Teaching Assistant, Computer Science Department   *Urbana, IL*

· Numerical Analysis (CS450)   *Fall 2018 & Spring 2019*
   - Led discussion sessions, tutored students, and answered questions via online platform
· Numerical Methods (CS357)   *Spring & Fall 2021*
   - Held office hours, created course content, answered student questions via online platform

PEER-REVIEWED PUBLICATIONS

[1] Voronin, A, He, Y, MacLachlan, S, Olson, LN, Tuminaro, R. Low-order preconditioning of the Stokes equations. Numer Linear Algebra Appl. 2021;e2426. https://doi.org/10.1002/nla.2426

[2] White, D, Voronin, A. "A computational study of symmetry and well-posedness of structural topology optimization." Structural and Multidisciplinary Optimization 59, no. 3 (2019): 759-766

[3] Li, A, Voronin, A, Fenley, A, Gilson, M. "Evaluation of Representations and Response Models for Polarizable Force Fields." The Journal of Physical Chemistry B 120, no. 33 (2016): 8668-8684

TECHNICAL REPORTS AND PROCEEDINGS

[1] Voronin, A, Tuminaro, R, Olson, LN, MacLachlan, S. AMG for Mixed Finite Element Representations of PDE Systems, in Computer Science Research Institute Summer Proceedings 2020, A.A. Rushdi and M.L. Parks, eds., Technical Report SAND2020-12580R, Sandia National Laboratories, 2020, pp. 127–137.

[2] Voronin, A, Tuminaro, R. Algebraic Multigrid based on Low-order Systems, in Computer Science Research Institute Summer Proceedings 2021, J.D. Smith and E. Galvan, eds., Technical Report SAND2022-0653R, Sandia National Laboratories, 2020, pp. 147–158.

PRESENTATIONS

[1] Monolithic SA-AMG for Saddle-point Systems, *AMG Summit (2021)*

[2] AMG for Mixed Finite Element Representations of Systems of PDEs, *SIAM Conference on Computational Science and Engineering (2021)*

[3] LFA of Low-Order Preconditioners for the Stokes equations, *20th Copper Mountain Conference On Multigrid Methods (2021)*

[4] Performance Optimization of Bloch-wave Code for the CORAL Systems, *Applications, Simulations and Quality (ASQ) seminar at LLNL Seminar Series (2018)*

OTHER WORK EXPERIENCE

Cymer, ASML   *June - September 2014*
Data Analyst Intern   *San Diego, CA*

· Co-designed and implemented a Markov chain Monte Carlo simulator in Python to improve the accuracy of part failure prediction in the currently installed lasers

SLAC National Accelerator Laboratory *June - August 2009 and 2010*
Summer Intern *Menlo Park CA*

· Automated collection of X-ray diffraction data and merging of different file formats
· Designed x-ray crystallography experiments and collected diffraction data, which I later used to solve and refine the molecular structure of proteins

ADDITIONAL INFORMATION

SIAM Student Chapter Officer (UIUC) *August - May 2018*
SIAM Student Chapter Treasurer (UIUC) *August 2019 - 2022*