

Ryan Vogt

National Security Agency
U.S. Department of Defense
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EDUCATION

North Carolina State University

Ph.D, Applied Mathematics *May 2020*
Advisor: Zhilin Li, Professor of Mathematics
Comittee Members: Sven Leyffer, David Aspnes,
Pierre Gremaud, Alen Alexanderian

Master of Science, Applied Mathematics *December 2018*

Master of Science, Operations Research *May 2018*

Rochester Institute of Technology

Bachelor of Science, Mathematics *May 2015*

Bachelor of Science, Computer Science *May 2015*

Finger Lakes Community College

Associates of Science, Computer Science *May 2013*

Associates of Science, Engineering Science *May 2013*

PROFESSIONAL EXPERIENCE

National Security Agency - Applied Research Mathematician *July 2021 - Present*

Directed projects focused on achieving high fidelity quantum gates, efficient execution of quantum circuits, and showcasing the potential of machine learning algorithms on theoretical quantum computers via classical simulations of quantum algorithms. Supported efforts to illustrate the capabilities of theoretical quantum computers, through classical simulations, in solving partial-differential equations and other applied mathematics problems that are computationally difficult or unsolvable by classical computers.

Lawrence Livermore National Laboratory- Postdoctoral fellow *July 2020-July 2021*

Project Title : Optimal Control Of Quantum Systems And The Next Generation of Quantum Computers

Argonne National Laboratory- Research assistant *August 2019-July 2020*

Mentor: Sven Leyffer, Todd Munson
Project Title : Theory, Implementation, and Applications of Mixed Integer Partial Differential Equation Constrained Optimization (MIPDECOs)

Argonne National Laboratory - Honorary Givens Associate *May 2019-August 2019*

Mentor: Sven Leyffer, Todd Munson
Project Title : Theory, Implementation, and Applications of Mixed Integer Partial Differential Equation Constrained Optimization (MIPDECOs)

Argonne National Laboratory - Research Assistant *August 2018-May 2019*

Mentor: Sven Leyffer, Todd Munson
Project Title : Theory, Implementation, and Applications of Mixed Integer Partial Differential Equation Constrained Optimization (MIPDECOs)

Argonne National Laboratory - Honorary Givens Associate *May 2018-August 2018*

Mentor: Sven Leyffer, Todd Munson

Project Title : Mixed Integer Partial Differential Equation Optimization(MIPDEO) For Electro-magnetic Cloaking.

RESEARCH
INTERESTS

Partial Differential Equations(PDEs), Optimization Theory (Linear, Nonlinear, Stochastic, Integer, Robust, Derivative Free), PDE Constrained Optimization, Integer PDE Constrained Optimization, Stochastic ODE/PDE, Uncertainty Quantification, Inverse Problems, Numerical Analysis, Quantum Mechanics, Electrodynamics, Quantum Electrodynamics, Quantum Computing, Inorganic Chemistry

PROFESSIONAL
REFERENCES

Dr. Sven Leyffer - **Argonne National Lab**
leyffer@anl.gov
https://wiki.mcs.anl.gov/leyffer/index.php/Sven_Leyffer
Phone: (630) 252-4698

Dr. Todd Munson - **Argonne National Lab**
tmunson@mcs.anl.gov
<https://www.mcs.anl.gov/~tmunson/>
Phone: (630) 252-4279

Several additional references available upon request.

PUBLICATIONS

1. Myers, C. J., et al. "Classical-quantum simulation of non-equilibrium Marshak waves." Journal of Plasma Physics 90.6 (2024): 805900601
 2. Parasyris, Konstantinos, et al. "Approximate computing through the lens of uncertainty quantification." SC22: International Conference for High Performance Computing, Networking, Storage and Analysis. IEEE, 2022.
 3. Vogt, Ryan H., and N. Anders Petersson. "Binary optimal control of single-flux-quantum pulse sequences." SIAM Journal on Control and Optimization 60.6 (2022): 3217-3236.
 4. Vogt, Ryan H., Sven Leyffer, and Todd S. Munson. "A mixed-integer PDE-constrained optimization formulation for electromagnetic cloaking." SIAM Journal on Scientific Computing 44.1 (2022): B29-B50.
 5. Vogt, Ryan H., and Sarah Strikwerda. "Solving bang-bang problems using the immersed interface method and integer programming." arXiv preprint arXiv:2104.08649 (2021).
 6. Petersson, N. Anders, et al. "Quantum Physics without the Physics." arXiv preprint arXiv:2012.03865 (2020).
 7. Alexander N. Pisarchik, Michael A. Radin, and Ryan Vogt, "Nonautonomous Discrete Neuron Model with Multiple Periodic and Eventually Periodic Solutions," Discrete Dynamics in Nature and Society, vol. 2015, Article ID 147282, 6 pages, 2015. doi:10.1155/2015/147282
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IN PREPARATION
PUBLICATIONS

1. R.H Vogt, R. Pereira, H. Rouillard, L. Andrews, E. Raff, J. Holt, F. Gaitan "Quantum Enhanced Machine Learning On Fault-Tolerant Error Corrected Quantum Computers: Translation and Large Language Models"
2. R.H Vogt, R. Pereira, H. Rouillard, L. Andrews, E. Raff, J. Holt, F. Gaitan "Discontinuous Galerkin Methods on Quantum Computers"
3. R.H Vogt, H. Rouillard, L. Andrews, E. Raff, J. Holt, F. Gaitan "Optimal Control on Quantum Computers"
4. R.H Vogt, H. Berjamine, H. Rouillard, L. Andrews, E. Raff, J. Holt, F. Gaitan "Weighted Essentially Non-Oscillatory Methods on Quantum Computers"

5. R.H Vogt, H. Rouillard, L. Andrews, E. Raff, J. Holt, F. Gaitan "Spectral Methods on Quantum Computers"
6. R.H Vogt, H. Rouillard, F. Gaitan "Continuous Galerkin Finite-Element Methods on Quantum Computers"
7. R.H Vogt, S. Leyffer, T. Munson "On Electromagnetic Cloaks Made Of Several Materials"
8. R.H Vogt "On The Stability of Finite Difference Methods for Nonlinear Equations"

HONORS & AWARDS

- Four separate awards for contributions in quantum information sciences (U.S. Department of Defense)
 - Post-doctoral fellow Lawrence Livermore National Laboratory (LLNL)
 - Givens Associate, Argonne National Laboratory(ANL)
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TECHNOLOGY

Python, C, C++, Fortran, Matlab, Latex, Java

PROFESSIONAL MEMBERSHIP

SIAM

JOURNAL REFEREE

- Journal of Computational and Applied Mathematics
 - Mathematical Programming
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TEACHING EXPERIENCE

- Instructor of record for "Multivariable Calculus" (NCSU, MA 242), Fall 2017, Fall 2018
 - Instructor of record for "Computational Math" (NCSU, MA 132), Spring 2017
 - Instructor of record for "Introduction to Finite Math" (NCSU, MA 114), Spring 2018
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GRADUATE COURSES

- Qualifying Exams Passed: Linear Algebra, Partial Differential Equations, Nonlinear Optimization Theory, Dynamical Systems
 - Additional Courses: Numerical Analysis I- II, Finite Element Method, Finite Difference Method, Spectral Method, Finite Volume Method, Perturbation Theory, Numerical Methods for Inverse Problems, Numerical Methods for PDE Optimization, Numerical Methods for Non-Linear Optimization, Integer Programming, Differential Equations I-II, Linear Algebra I-II, Functional Analysis, Control Theory, Differential Geometry, Uncertainty Quantification, Inverse Problems, Advanced Electrodynamics, Quantum Electrodynamics, Quantum Optics.
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