Nicholas J. Dubicki

Applied and Computational Mathematics | Adjunct Professor
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Education

Ph.D. -- Mathematical Sciences | New Jersey Institute of Technology; Newark, NJ | 08/2024 | GPA 4.0

M.S. -- Applied Mathematics | University of New Hampshire; Durham, NH | 08/2019

B.S. -- Mechanical Engineering | University of New Hampshire; Durham, NH | 05/2017 | Magna Cum Laude

Employment

Adjunct Professor of Mathematics | 08/2024 - Present | New Jersey Institute of Technology | Newark, NJ

- Teach college mathematics to STEM students and contribute to the design of academic curricula.

Research and Teaching Assistant | 08/2019 - 08/2024 | New Jersey Institute of Technology | Newark, NJ

- Developed and implemented analytical and high-performance numerical models of magnetic materials in Go, C++, deploying cluster resources and GPUs to accelerate and pipeline computation.
- Discovered new existence and collapse criteria of magnetic skyrmions in thin ferromagnetic systems leading to two journal articles, and dissemination through conference posters.
- Implemented modern numerical techniques in MATLAB to study reduced micromagnetic equations and process gigabytes of simulation data to establish cross validation between theory and simulation.
- Equipped colleagues with essential tools by leading workshops on Python, C, Numerical Methods, Data Visualization and High-Performance Computing for new Ph.D. students.
- Chaired organizing committee for graduate student and adjunct professor association. Coordinated campus wide networking and informational events.

Research and Teaching Assistant | 08/2017 - 08/2019 | University of New Hampshire | Durham, NH

- Integrated multiple heat transfer models, unit operations, and derived models for thermal properties of coolants to create scientific software to model vapor compression refrigeration cycles.
- Developed fully integrated hybrid theory/data-driven models of thermal properties of coolants.
- Developed computational solvers based on optimization principles.
- Designed data processing algorithms and predictive models for large-scale fluid dynamics simulations.
- Supervised instruction to students in *Experimental Methods / Data Analysis* and *Thermal System Analysis* by laboratory experiments and project-based learning.

Research Support Associate | 05/2017 - 08/2017 | MIT | Cambridge, MA

- Formulation, signal processing and classification of acoustic waves for sonar applications.
- Summarized and communicated findings to industry partners for real-world applications.

Skills

Programming: C++, Python, MATLAB, SQL, R, Julia, Linux/Bash Scripting

Tools: GitHub, Docker, Pandas, PySpark, Jax, PyTorch, Keras, TensorFlow, Scikit-learn, Matplotlib, Jupyter Notebooks, Solidworks, Azure, COMSOL, SLURM, OpenMP, MPI, CUDA

Expertise: High Performance Computing and Architectures, Parallel Computing, Reinforcement Learning, Deep Learning, Deep Neural Networks, Data Science, Signal Processing, Feature Engineering, Control Systems, Time Series Analysis and Forecasting, PDEs and SDEs, Statistical Inference, Finite Element Methods, Monte-Carlo Simulation Methods, Spanish (Conversational reading/writing/speaking)

Research Interests

Algorithm Development, Multi-physics Modeling, Electromagnetism, Ferromagnetic Materials, Thermodynamics, Fluid Dynamics Optimization, Measure Theory, Variational Analysis, Stochastic Processes, Numerical Simulation, Asset Modeling, Design of Experiments,

Publications

1. N. J. Dubicki, V. V. Slastikov, A Bernand-Mantel, and C. B. Muratov, *Skyrmion Stacking in Stray Field Coupled Ultrathin Ferromagnetic Multilayers.* Journal of Nonlinear Science. 2025. Under Review.

2. N. J. Dubicki, *A Micromagnetic Study of Skyrmions in Thin-Film Multilayered Ferromagnetic Materials*, Ph.D. thesis, New Jersey Institute of Technology, Newark, NJ, 2024.

3. N. J. Dubicki, *Use of Optimization Techniques in the Steady State Simulation of Vapor Compression Refrigeration Cycles*, Master's thesis, University of New Hampshire, Durham, NH, 2019.

Manuscripts in Preparation

4. A. Bernand-Mantel, N. J. Dubicki, C. B. Muratov, and T. M. Simon, *Stray field enabled skyrmions in ferromagnetic films of finite thickness*, 2025. Manuscript in Preparation.

Other Projects

- **Misc. Data Science**: Yahoo finance data scraping, options pricing, and options volatility in Python.

- **Reinforcement Learning**: Q-learning, Approximate Dynamic Programming, Deep Q-Networks, and Policy gradient methods in Python on several scenarios: Multi-Armed Bandits, Cart-Pole Control, Discrete Black-Scholes Financial Model, and playing Hangman and Black Jack.

- **Optics**: Fast solver API for simulation of 2D maxwells equations in mixed vacuum/dielectric/conductor systems written in MATLAB with object oriented paradigms for user-customizable simulation environments.

- **High Performance Computing**: Fast solvers and simulation environment for the KdV equation in C++ for the purpose of testing implementations of various parallel schemes: OpenMP, CUDA

Awards

- Daljit S. Ahluwalia Doctoral Fellowship, New Jersey Institute of Technology, (Academic merit)

Seminars and Conferences

- Conference Poster. "Reevaluating Stability of Stray Field Driven Magnetic Skyrmions in Thin-Film Ferromagnetic Materials". Frontiers of Applied and Computational Mathematics. NJIT. Newark, NJ. May, 2023
- Department Talk. "Skyrmions in Ferromagnetic Thin-Film Bilayers". NJIT. Newark, NJ. July 2022
- Department Talk. "Topologically Nontrivial Magnetic Structure in 2D". NJIT. Newark, NJ. July 2021
- Department Talk. "Electrostatics". NJIT. Newark, NJ. January 2020
- Department Talk. "Inviscid and Irrotational Fluid Dynamics". NJIT. Newark, NJ. December 2019

Professional references available upon request.