Sara Ichinaga

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I am an applied mathematician with extensive experience with data analysis, mathematical modeling, and machine learning. I am interested in developing data-driven algorithms and software for applications across various scientific and engineering disciplines.

SUMMARY OF QUALIFICATIONS

- Ph.D. candidate in applied mathematics with a focus on algorithm development for data-driven modeling.
- Python expert with experience developing software packages and collaborating on open-source code.
- Experience presenting high-level mathematics and machine learning concepts to various audiences.

EDUCATION

Ph.D. in Applied Mathematics, GPA 3.92/4.0, University of Washington, Seattle, WA — **Expected June 2026**

M.S. in Applied Mathematics, GPA 3.87/4.0, University of Washington, Seattle, WA — **Dec 2022**

B.S. in Applied and Computational Mathematical Sciences, — **June 2021**
GPA 3.94/4.0, Magna Cum Laude, University of Washington, Seattle, WA

RELEVANT COURSEWORK

- (CSE 414) Database Systems
- (CSE 546) Machine Learning
- (CSE 547) Machine Learning for Big Data
- (AMATH 515) Optimization: Fundamentals and Applications
- (AMATH 582) Computational Methods for Data Analysis
- (AMATH 584) Numerical Linear Algebra

SELECTED PROFESSIONAL EXPERIENCE

Graduate Research and Teaching Assistant to Dr. J. Nathan Kutz and Dr. Steven L. Brunton — **Sept 2021-Present**
Department of Applied Mathematics, University of Washington — **Seattle, WA**

- Developed two noise-robust methodological extensions of the dynamic mode decomposition (DMD) algorithm: (1) sparse-mode DMD for learning spatially local and global structures from time-varying snapshot data, and (2) mrCOSTS for decomposing multi-scale data into dominant frequency components.
- Formulating new noise-robust methods for DMD with control (DMDc) by utilizing the weak form of the differential equation. Investigating methods by examining data from real-word material heating scenarios.
- Developer and maintainer for the open-source Python package PyDMD: https://github.com/PyDMD/PyDMD.
- Teaching assistant for ENGR 510, an introductory machine learning course for engineering professionals.

Computational Software Development Graduate Student Intern — **June 2025-Sept 2025**
National Renewable Energy Laboratory (NREL) — **Golden, CO**

- Developed PyRidge, an NREL Python package for data-driven surrogate modeling, active subspace learning, and parameter dimension reduction via ridge function approximation: https://github.com/NREL/PyRidge.
- Applied PyRidge to NREL data sets and determined under-sampled regions of design parameter space.
- Developed optimization formulations beyond what was currently being used at NREL, including active subspace optimization over multiple output functions for learning shared active subspaces.

SELECTED PUBLICATIONS AND PREPRINTS

- Sara M. Ichinaga, Steven L. Brunton, Aleksandr Y. Aravkin, and J. Nathan Kutz. "Sparse-mode dynamic mode decomposition for disambiguating local and global structures." 2025. [preprint]
- Sara M. Ichinaga, Francesco Andreuzzi, Nicola Demo, Marco Tezzele, Karl Lapo, Gianluigi Rozza, Steven L. Brunton, and J. Nathan Kutz. "PyDMD: A Python package for robust dynamic mode decomposition." *JMLR.* 2024. **25**(417):1-9. [paper] [long version on arXiv]
- Karl Lapo, Sara M. Ichinaga, and J. Nathan Kutz. "A method for unsupervised learning of coherent spatiotemporal patterns in multi-scale data." *PNAS.* 2024. **122**(7):e2415786122. [paper]

TECHNICAL SKILLS

Coding Languages: Python (expert), MATLAB, Bash, Java, SQL, R
Python Libraries: NumPy, Matplotlib, SciPy, PyTorch, Scikit-Learn, Pandas, CVXPY, PyTest
Technologies: Git/GitHub, Jupyter, Anaconda, LaTeX, Microsoft Azure