

Amirpasha Hedayat

SCIENTIFIC MACHINE LEARNING · AI FOR SCIENCE · COMPUTATIONAL PHYSICS

📍 Ann Arbor, MI, USA | ✉️ ahedayat@umich.edu | 🌐 [aphedayat.github.io](https://github.com/aphedayat) | [in](#) Amirpasha Hedayat

RESEARCH INTERESTS

My research focuses on scientific machine learning and AI for science, with an emphasis on reduced-order modeling, operator learning, and neural surrogates. My long-term goal is to develop fast and reliable physics-informed ML/AI models that enable near-real-time prediction, control, and decision-making for complex dynamical systems.

EDUCATION

- PhD** **University of Michigan**, Aerospace Engineering & Scientific Computing Aug 2023 – Present
Ann Arbor, MI, USA
- Expected graduation: May 2028
 - Advisor: Prof. Karthik Duraisamy
 - Affiliated with the Michigan Institute for Computational Discovery and Engineering (MICDE)
- MSc** **University of British Columbia**, Mechanical Engineering Aug 2020 – Nov 2022
Vancouver, BC, Canada
- GPA: 4.0/4.0 (92% local; 1st in class)
 - Advisor: Prof. Carl Ollivier-Gooch
 - Thesis: *Detecting Missing Flow Separation and Predicting Error in Drag Using Supervised Machine Learning* [🔗](#)
- BS** **Amirkabir University of Technology**, Aerospace Engineering Sep 2015 – Oct 2019
Tehran, Iran
- GPA: 19.0/20.0 (1st in class)
 - Advisor: Prof. Sahar Noori
 - Thesis: *Estimation of Unknown Heat Flux in a 2-D Heat Sink Using the Levenberg–Marquardt Inverse Algorithm*

RESEARCH EXPERIENCE

- University of Michigan**, Graduate Research Assistant Aug 2023 – Present
Ann Arbor, MI, USA
- Developing adaptive reduced-order models with online learning for real-time model updates.
 - Building fast ML/AI surrogate models for complex dynamical systems (e.g., weather, plasma).
 - Exploring self-supervised and online adaptation of neural operators for improved generalization.
- University of British Columbia**, Graduate Research Assistant Aug 2020 – Nov 2022
Vancouver, BC, Canada
- Built modal decomposition workflow to detect missing flow patterns.
 - Trained ML classifiers to automatically flag under-resolved CFD simulations.
 - Trained ML regressors to predict drag force from reduced flow features.
- Amirkabir University of Technology**, Undergraduate Research Assistant Sep 2017 – Oct 2019
Tehran, Iran
- Implemented inverse heat-transfer algorithm to estimate unknown heat flux in a 2D heat sink.
 - Performed CFD simulations of flapping airfoils to study unsteady aerodynamic behavior.

PUBLICATIONS

JOURNAL ARTICLES

- **Hedayat, A.**, Balzano, L., and Duraisamy, K. “In-Span Learning: Adapting Reduced-Order Models Using Their Own Predictions,” *Nature Communications*, arXiv:2607.02937, 2026.  UNDER REVIEW
- **Hedayat, A.**, Mohaghegh, A., Balzano, L., Huang, C., and Duraisamy, K. “History-Aware Adaptive Reduced-Order Models via Incremental Singular Value Decomposition,” *Journal of Computational Physics*, arXiv:2605.28684, 2026.  UNDER REVIEW
- **Hedayat, A.**, Padovan, A., and Duraisamy, K. “Toward Adaptive Non-Intrusive Reduced-Order Models: Design and Challenges,” *Structural and Multidisciplinary Optimization*, 69(6), art. 151, 2026. 
- **Hedayat, A.**, and Duraisamy, K. “Attention-Enhanced Convolutional Autoencoder and Structured Delay Embeddings for Weather Prediction,” arXiv:2511.12682, 2025.  PREPRINT
- **Hedayat, A.**, and Ollivier-Gooch, C. “Detecting Under-Resolved Flow Physics Using Supervised Machine Learning,” *AIAA Journal*, 61(9), 3958–3975, 2023. 

CONFERENCE PAPERS & THESES

- **Hedayat, A.**, and Ollivier-Gooch, C. “Detecting Missing Flow Separation Using Supervised Machine Learning,” *AIAA SciTech 2023 Forum*, 2023. 
- **Hedayat, A.** “Detecting Missing Flow Separation and Predicting Error in Drag Using Supervised Machine Learning,” *M.A.Sc. Thesis, University of British Columbia*, 2022. 

INTELLECTUAL PROPERTY

- “In-Span Learning: Self-Supervised Adaptation of Reduced-Order Models,” *Invention Disclosure*, Innovation Partnerships, University of Michigan, 2026. FILED

TALKS & PRESENTATIONS

- “In-Span Learning,” *SIAM Annual Meeting (AN26)*, Cleveland, OH, July 2026.
- “Adaptive Non-Intrusive Reduced-Order Models for Transient Flow Predictions,” *AIAA SciTech 2026 Forum*, Orlando, FL, January 2026.
- “Non-Intrusive Adaptive Reduced-Order Models for Predictive Modeling of Complex Systems,” *18th U.S. National Congress on Computational Mechanics (USNCCM18)*, Chicago, IL, July 2025.
- “Linear and Nonlinear Reduced Dimensional Manifolds for Global Weather Predictions,” *Model Reduction and Surrogate Modeling (MORe 2024)*, San Diego, CA, September 2024.
- “Detecting Missing Flow Separation Using Supervised Machine Learning,” *AIAA SciTech 2023 Forum*, National Harbor, MD, January 2023.

AWARDS & HONORS

Graduate Student Academic Achievement Award, University of British Columbia	2022
NSERC Graduate Fellowship, Natural Sciences and Engineering Research Council of Canada	2020–2022
International Tuition Award, University of British Columbia	2020–2022
Faculty of Applied Science Graduate Award, University of British Columbia	2020–2022
Distinguished B.Sc. Graduate — ranked 1st of ~150, Amirkabir University of Technology	2019
Iran’s National Elites Foundation (INEF) Scholarship	2018–2019
Aerospace Engineering Academic Excellence Award, Amirkabir University of Technology	2016–2019

TECHNICAL SKILLS

Programming Languages	Python, C/C++, MATLAB/Octave, Julia
ML Frameworks	PyTorch, JAX, TensorFlow/Keras, scikit-learn
Scientific Computing	NumPy/SciPy, MPI, high-performance and GPU computing, CFD solvers
Tools & Platforms	Git/GitHub, Autotools/Make, shell scripting, $\LaTeX$; Linux, macOS, Windows
Spoken Languages	English (fluent), Persian (native)