

Hojin Kim

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Education

Purdue University <i>PhD in Mechanical Engineering</i> Advisor: Assistant Prof. Romit Maulik	<i>IN, United States</i> Aug. 2025 – Present
The Pennsylvania State University <i>PhD in Informatics</i> Advisor: Assistant Prof. Romit Maulik	<i>PA, United States</i> Aug. 2024 – Aug. 2025 (Transfer to Purdue University)
Seoul National University <i>MS in Aerospace Engineering</i> Advisor: Prof. Kwanjung Yee	<i>Seoul, Republic of Korea</i> Mar. 2021 – Feb. 2023
Seoul National University <i>BS in Aerospace Engineering</i>	<i>Seoul, Republic of Korea</i> Mar. 2015 – Feb. 2021

Research Interest

Computational Fluid Dynamics (CFD), Machine learning, Turbulence, Optimization

Honors and Awards

Travel Award for The UChicago & Caltech AI+Science Conference 2026 University of Chicago, USA	<i>Chicago, IL, USA</i> Oct. 2026
Travel Award for The IMSI "Statistical Foundations of Generative Modeling" Workshop The Institute for Mathematical and Statistical Innovation, USA	<i>Chicago, IL, USA</i> Oct. 2026
Purdue Graduate Student Government Travel Award Purdue University, USA	<i>West Lafayette, IN, USA</i> Mar. 2026
Argonne Training Program on Extreme-Scale Computing (ATPESC) Argonne National Laboratory, USA : Selected participant, intensive program on high-performance computing and scalable algorithms	<i>St. Charles, IL, USA</i> Jul. 2025 - Aug. 2025
Student Travel Award for the 2025 SIAM Conference on Computational Science and Engineering (CSE25) Society for Industrial and Applied Mathematics (SIAM)	<i>Jan. 2025</i>
The Ruth Young Boucke Graduate Fellowship The Robert W. Graham Endowed Graduate Fellowship The Pennsylvania State University, PA, United States	<i>Aug. 2024</i>
Merit-based Scholarship Seoul National University, Seoul, Republic of Korea	<i>Spring 2015, Spring 2022</i>

Experience

Lawrence Livermore National Laboratory (LLNL)

Graduate Research Intern

Livermore, CA, USA
May. 2026 – Aug. 2026

- Developed graph neural network (GNN)-based surrogate models to accelerate smoothed particle hydrodynamics (SPH) simulations of multiphase flow in carbon capture applications
- Collaborated with researchers on scientific machine learning workflows, including dataset preprocessing and physics-informed model design using NVIDIA's PhysicsNeMo framework

Publication

H. Kim, D. Chakraborty, T. Toki, C. Scalo, R. Maulik (2026). "Multiscale Hypersonic Boundary Layer Reconstruction via Spectral Binning and Subdomain-wise Conditional Diffusion," *under review*, *arXiv:2606.15023*.

D. Chakraborty, **H. Kim**, R. Maulik (2026). "Adaptive Diffusion Posterior Sampling for Data and Model Fusion of Complex Nonlinear Dynamical Systems," *under review*, *arXiv:2603.12635*.

H. Kim, R. Maulik (2025). "Towards Interpretable Deep Learning and Analysis of Dynamical Systems via the Discrete Empirical Interpolation Method," *under review*, *arXiv:2510.21852*.

H. Kim, V. Shankar, V. Viswanathan, R. Maulik (2026). "Generalizable data-driven turbulence closure modeling on unstructured grids with differentiable physics.," *Computers & Fluids*, 318, 107200.

S. Barwey, **H. Kim**, R. Maulik (2025). "Interpretable A-posteriori error indication for graph neural network surrogate models.," *Computer Methods in Applied Mechanics and Engineering*, 433, 117509.

H. Kim, J. Lee, D. Lee, K. Yee (2025). Improved Conceptual Design of eVTOL Aircraft: Considering Rotor-Rotor Interactional Effects. *International Journal of Aeronautical and Space Sciences*, 1-20.

S. Yang, **H. Kim**, Y. Hong, K. Yee, R. Maulik, N. Kang (2024). "Data-driven physics-informed neural networks: A digital twin perspective.," *Computer Methods in Applied Mechanics and Engineering*, 428, 117075.

Conference

20th U.S. National Congress on Theoretical and Applied Mechanics (USNC-TAM)

H. Kim, R. Maulik

"Generalizable data-driven turbulence closure modeling on unstructured grids with differentiable physics"

Pasadena, CA, USA
June. 2026

SIAM Conference on Uncertainty Quantification (UQ26)

H. Kim, D. Chakraborty, T. Toki, C. Scalo, R. Maulik

"Conditional Diffusion Models for High-speed Boundary Layer Reconstructions"

Minneapolis, MN, USA
Mar. 2026

2026 Joint Mathematics Meetings

H. Kim, R. Maulik

"Interpreting Learned Physics in Neural ODEs through a DEIM-based Spatio-temporal Analysis"

Washington DC, USA
Jan. 2026

APS 78th Annual Division of Fluid Dynamics Meeting

H. Kim, R. Maulik

"Interpreting Learned Physics in Neural ODEs through a DEIM-based Spatio-temporal Analysis"

Houston, TX, USA
Nov. 2025

18th U.S. National Congress On Computational Mechanics

S. Barwey, **H. Kim**, R. Maulik

"Scalable, interpretable, and explainable scientific machine learning with geometric

Chicago, IL, USA
Jul. 2025

deep learning”

2025 SIAM Conference on Computational Science and Engineering

H. Kim, R. Maulik

“Differentiable physics for generalizable closure modeling of separated flows”

Fort Worth, TX, USA

Mar. 2025

APS 77th Annual Division of Fluid Dynamics Meeting

H. Kim, R. Maulik

“Differentiable physics for generalizable closure modeling of separated flows”

Salt Lake City, UT, USA

Nov. 2024

48th European Rotorcraft Forum

H. Kim, J. Seo, D. Lee, Y. Hong, K. Yee

“Design Methodology of Urban Air Mobility for Noise Mitigation at the Conceptual Design Stage”

Winterthur, Switzerland

Sep. 2022

Workshops

2026 AAI XAI4Science workshop

H. Kim, R. Maulik

“Towards Interpretable Deep Learning and Analysis of Dynamical Systems via the Discrete Empirical Interpolation Method”

Singapore

Jan. 2026

2025 Purdue CCAM workshop - Scientific Machine Learning: Theory, Algorithms, and Applications

H. Kim, R. Maulik

“Differentiable physics for generalizable closure modeling of separated flows”

West Lafayette, IN, USA

Sep. 2025

2025 AAI Bridge Program - Knowledge-Guided Machine Learning

H. Kim, S. Barwey, R. Maulik

“Scalable, adaptive, and explainable scientific machine learning with applications to surrogate models of partial differential equations”

Philadelphia, PA, USA

Feb. 2025

2024 AAI Symposium on Integrated Approaches to Computational Scientific Discovery

H. Kim, S. Barwey, R. Maulik

“Scalable, adaptive, and explainable scientific machine learning with applications to surrogate models of partial differential equations”

Arlington, VA, USA

Nov. 2024

Professional Service

Journal Review

Journal reviewer for - Journal of Fluid Mechanics, Journal of Computational Physics, Physics of Fluids, International Journal for Heat and Fluid Flow