ETH zürich

Shizheng Wen

——, Rämistrasse 101, 8092 Zürich, Switzerland
(41)765-4567-09 • shiwen@ethz.ch • shizheng-wen.github.io/

My research interests lies on scientific machine learning (SciML) and AI4Science. On the one hand, I am trying to develop more robust and reliable AI models fusing different numerical methods (FEM, FVM and FD). On the other hand, I am trying to apply the AI in accelerating the scientific discovery in different disciplines, including applied physics/mechanics. Specifically, my research lies in following topics:

- SciML: physics-informed learning (graph neural network), differentiable physics solver, FEM/FVM/FD
- AI4Science: fluid mechanics, nanoscale heat transfer, biomolecular motor (molecular dynamics)

Education

- **ETH Zürich** Course Category and Personal Notes — **Zürich, Switzerland**
  M.S. Candidate — *2022 – present*
  Computational Science and Engineering, Department of Mathematics
  Advisor: Siddhartha Mishra and Robert Katzschmann
- **Nanjing University of Aeronautics and Astronautics** — **Nanjing, China**
  Undergraduate, GPA: 92/100 (with distinction) — *2016 – 2020*
  Aerospace Engineering, School of Energy and Power Engineering
  Advisor: Xianglei Liu

Publication

Google Scholar (* denotes the corresponding author)

1. Wei Tang, **Shizheng Wen**, Huilong Hou, Qihua Gong*, Min Yi*, Wanlin Guo*. **Phase-field simulation and machine learning of low-field magneto-elastocaloric effect in a multiferroic composite**, *under revision by Int. J. Mech. Sci.* (2023).
2. **Shizheng Wen***, Michael W. Lee, Kai M. Kruger Bastos, Ian Eldridge-Allegra, Earl H. Dowell. **Feature Identification in Complex Fluid Flows by Convolutional Neural Networks**, *Theor. App. Mech. Lett.* 13 (2023), 100482.
3. **Shizheng Wen**, Chunzhuo Dang, Xianglei Liu*. **A Machine Learning Strategy for Modeling and Optimal design of Near-Field Radiative Heat Transfer**, *Appl. Phys. Lett.* 121 (2022), 071101.
4. Chunzhuo Dang, Xianglei Liu*, Haifeng Xia, **Shizheng Wen**, Qiao Xu. **High-performance three-body near-field thermophotovoltaic energy conversion**, *J. Quant. Spectrosc. Radiat. Transf.* 259 (2020), 107411.
5. **Shizheng Wen**, Xianglei liu*, Sheng Cheng, Zhoubing Wang, Shenghao Zhang, Chunzhuo Dang. **Ultra-high thermal rectification based on near-field thermal radiation between dissimilar nanoparticles**, *J. Quant. Spectrosc. Radiat. Transfer* 234 (2019), pp. 1-9.

Research Experience

- **ETH AI Center** — **Zurich, Switzerland**
  ETH Zurich — *2023.8-2023.11*
  Host: Siddhartha Mishra and Ben Moseley
  Topic: Physics-informed Galerkin Autoregressive Graph Network for Spatiotemporal PDEs.

Gaoling School of Artificial Intelligence — **Beijing, China**
Renmin University of China — *2022.4-2022.8*

Host: Hao Sun
Topic: Working on graph neural networks and partial differential equations.

Institute of Nano Science — **Nanjing, China**
Nanjing University of Aeronautics and Astronautics — *2020.10-2022.4*

Host: Wanlin Guo
Topic: Working on the underlying mechanism of ultra-low energy loss in biomolecular motor.

Duke Aeroelasticity Group — **Durham, NC, U.S.**
Duke University — *2019.7-2019.10*

Host: Earl Dowell
Topic: Working on the fusion of machine learning and nonlinear fluid flows.

Institute of Comprehensive Energy Studies — **Nanjing, China**
Nanjing University of Aeronautics and Astronautics — *2017.9-2020.6*

Host: Xianglei Liu
Topic: Working on the near-field radiative heat transfer and AI-assisted modeling and design of nanoscale thermal devices.

SKILLS AND OTHERS

Featured Course Projects: Physics-informed Neural Networks, Operators Learning, differential solver for physical based simulation, constrained Bayesian optimization in drug discovery, transfer learning for modeling solar battery.
Programming: Expertise in Python (pytorch,numpy), Matlab, C++
Simulations: Finite element programming, molecular Dynamics (VMD, NAMD, tcl/tk language)
Hobbies: Violin, Guitar, Tennis, Soccer, Billiards, Swimming, Music, Rubik's Cube

HONORS AND AWARDS

Best Undergraduate Thesis award (top 1%)	2020
University Achievements Award (nominee), NUAA (the highest honor for graduates)	2020
Chancellor's Honorary Scholarships, NUAA (the highest honor for undergraduate student)	2019
National Scholarship, Ministry of Education of P.R. China (top 1%)	2019
Boeing Scholarship, Boeing Aerospace company (16 among the whole university)	2018
Nanjing University of Aeronautics and Astronautics Scholarship - First Prize (top 3%)	2017-2019

REFERENCE BOARD

Earl Dowell earl.dowell@duke.edu, Duke University, U.S.
- Distinguished Professor, AIAA Honorary Fellow, Member of National Academy of Engineering

Wanlin Guo wlguo@nuaa.edu.cn, Nanjing University of Aeronautics and Astronautics, China
- Distinguished Professor of Institute for Frontier Science, Member of Chinese Academy of Science

Siddhartha Mishra siddhartha.mishra@sam.math.ethz.ch, ETH Zurich, Switzerland
- Professor at Mathematics, P.I. of Computational and Applied Mathematics Lab

Hao Sun haosun@ruc.edu.cn, Renmin University of China, China
- Professor at Gaoling School of AI, Affiliate Professor at Northeastern University (Boston, MA).

Xianglei Liu xliu@nuaa.edu.cn, Nanjing University of Aeronautics and Astronautics, China
- Professor and Associate Dean School of Energy and Power Engineering