MINGLANG YIN, PH.D.

Department of Biomedical Engineering, Johns Hopkins University, Baltimore, MD, 21218

myin16@jhu.edu

EDUCATION

Postdoctoral Fellow, Department of Biomedical Engineering, Johns Hopkins University — 2022 - Present
Advisor: Dr. Natalia Trayanova

Ph.D., Biomedical Engineering, Brown University — 2018 - 2022
Advisor: Dr. George Em. Karniadakis

M.Sc., Fluids and Thermal Sciences, Brown University — 2016 - 2018
Advisor: Dr. George Em. Karniadakis

B.S., Aeronautical Engineering,Northwestern Polytechnical University, China — 2012 - 2016
Advisor: Dr. Weiwei Zhang

RESEARCH INTERESTS

Cardiovascular Diseases, Electrophysiology, Scientific Machine Learning, Biomechanics, Computational Mechanics, Multiscale Modeling, Uncertainty Quantification

HONORS AND AWARDS

Kenneth M. Rosen Fellowship in Cardiac Pacing and Electrophysiology, Heart Rhythm Society — 2023

Travel Award, 17th U. S. National Congress on Computational Mechanics — 2023

Robert J. Melosh Medal Competition Finalist — 2022

Chinese Government Award for Outstanding Self-Finance Students Abroad (1/600, globally) — 2022

Distinguished Fellowship Finalist, Department of Biomedical Engineering, Johns Hopkins University — 2022

Sigma Xi Honor Society Member — 2021

Conference Award, 16th U.S. National Congress on Computational Mechanics — 2021

Travel Award, San Diego Supercomputing Center summer institute on High Performance Computing and Data Science — 2019

Undergraduate Scholarship, Northwestern Polytechnical University — 2014

PUBLICATIONS

Academic Journals

M. Yin*, Z. Zou*, E. Zhang, C. Cavinato, J.D. Humphrey, G.E. Karniadakis. A generative modeling framework for inferring families of biomechanical constitutive laws in data-sparse regimes. arXiv preprint arXiv:2305.03184 (2023).

M. Yin, E. Zhang, Y. Yu, G.E. Karniadakis. Interfacing finite elements with deep neural operators for fast multiscale modeling of mechanics problems. Computer Methods in Applied Mechanics and Engineering, (2022): 115027

M. Yin, E. Ban, E. Zhang, B. Rego, C. Cavinato, J.D. Humphrey, G.E. Karniadakis. Simulating progressive intramural damage leading to aortic dissection using an operator-regression neural network, Journal of The Royal Society Interface, (2022): 20210670.

S. Goswami, **M. Yin**, Y. Yu, G.E. Karniadakis. A physics-informed variational DeepONet for predicting the crack path in brittle materials, Computer Methods in Applied Mechanics and Engineering, 391 (2022): 114587.

S. Cai, Z. Mao, Z. Wang, **M. Yin**, G.E. Karniadakis, Physics-informed neural networks in fluid mechanics: A review, Acta Mechanica Sinica (2022): 1-12.

A. Blumers*, **M. Yin***, Y. Hasegawa, Z. Li, and G.E. Karniadakis. Multiscale parareal algorithm for long-time mesoscopic simulations of microvascular blood flow in zebrafish, Computational Mechanics, 68, 1131-1152 (2021).

M. Yin, X. Zheng, J.D. Humphrey, G.E. Karniadakis. Non-invasive inference of thrombus material properties with physics-informed neural networks, Computer Methods in Applied Mechanics and Engineering, 375 (2021): 113603.

M. Yin, A. Yazdani, and G.E. Karniadakis. One-dimensional modeling of fractional flow reserve in coronary artery disease: uncertainty quantification and bayesian optimization, Computer Methods in Applied Mechanics and Engineering, 353 (2019): 66-85.

D. Hopper, D. Jaganathan, J. Orr, J. Shi, F. Simeski, **M. Yin**, J.T.C. Liu. Heat transfer in nanofluid boundary layer near adiabatic wall, Journal of Nanofluids, 7.6 (2018): 1297-1302.

M. Yin, J. Kou, W. Zhang. A reduced-order aerodynamic model with high generalization capability based on neural network, Acta Aerodynamica Sinica, 35.02 (2017): 205-213.

J. Kou, W. Zhang, and **M. Yin**. Novel Wiener models with a time-delayed nonlinear block and their identification, Nonlinear Dynamics, 85.4 (2016): 2389-2404.

Conference Articles

E. Zhang, **M. Yin**, G.E. Karniadakis. Physics-informed neural networks for nonhomogeneous material identification in elasticity imaging, AAAI Conference (2020).

Conference Abstracts

A novel deep learning model for patient-specific computational modeling of cardiac electrophysiology. Heart Rhythm 20.5 (2023): S163.

MARS-HCM: Multi-modal deep learning method for ventricular arrhythmia (VA) risk stratification in hypertrophic cardiomyopathy (HCM) patients. Heart Rhythm 20.5 (2023): S46-S47.

Patents

MARS-HCM: Multi-modal deep learning method for ventricular arrhythmia (VA) risk stratification in hypertrophic cardiomyopathy (HCM) patients, 2023

Thesis

Ph.D. Thesis: Hybrid Computational-Machine Learning Models with Uncertainty Quantification for Aortic Dissection, Advisor: Dr. George Em Karniadaki

M.S. Thesis: 3D/1D Computed Fractional Flow Reserve Comparison in Coronary Artery Disease, Advisor: Dr. George Em Karniadakis

B.S. Thesis: Reduced-Order Aerodynamic Modeling and Study on Generalization Capability, Advisor: Dr. Weiwei Zhang

CONFERENCES

Organizing Committee

Sep. 2023, Mini-symposium: Machine Learning for Modeling Cardiovascular Diseases, MMLDE-CSET (El Paso, TX)

Conferences Participation

Jul. 2023, USNCCM17 (Albuquerque, NM), A Neural Operator for Parametric Geometries

Jun. 2023, The Platform for Advanced Scientific Computing (PASC) Conference (Online), A Novel Deep Learning Model for Patient-Specific Computational Modeling of Cardiac Electrophysiology

May 2023, Heart Rhythm 2023 (New Orleans, LA), A Novel Deep Learning Model for Patient-Specific Computational Modeling of Cardiac Electrophysiology

Jun. 2022, USNC/TAM (Austin, TX), Multiscale Modeling with Operator-Learning Neural Networks

Jun. 2022, USNC/TAM (Austin, TX), Imaging-Driven Modeling of Dissection Progression in the Aorta

Apr. 2022, SIAM UQ (Online), Multiscale modeling with operator-regression neural networks

Nov. 2021, IMECE (Online), Predicting injection-caused delamination in aortic walls using DeepONet

Oct. 2021, IACM Computational Fluids Conference (Online), Imaging-driven inference of biomaterial properties with physics-informed neural networks

Jul. 2021, USNCCM16 (Online), Data-driven modeling of injection-caused delamination on aortic walls using DeepONet

Nov. 2020, APS DFD (Online), Non-invasive inference of thrombus material properties with physics-informed neural networks

Mar. 2020, Mach Conference (Accepted), Physics-informed neural networks for solving forward and inverse problem with phase field models

Nov. 2019, APS DFD (Seattle, WA), Comparison of multi-scale models for blood flow in zebrafish brain, APS Division of Fluid Dynamics

Oct. 2019, BMES Annual Meeting (Philadelphia, PA) (Poster), Numerical study on hemodynamics of brain vasculature in Early zebrafish Life

Jan. 2019, SIAM CSE (Spokane, WA), Parameter inference and uncertainty quantification in simulating blood flow in coronary arteries

INVITED TALKS

Apr. 2023, CIS/MINDS seminar, Johns Hopkins University

Feb. 2023, School of Medicine/Whiting School of Engineering Research Retreat, Invited Lightening Talk, Johns Hopkins University

Oct. 2022, Robert J. Melosh Competition, Civil & Environmental Engineering, Duke University

Sep. 2022, Complex Fluids and Soft Matters (CFSM) seminar series, Department of Mechanical Engineering, Clemson University (Online)

Jan. 2022, Department of Biomedical Engineering, Johns Hopkins University (Online)

Aug. 2021, School of Aeronautics, Northwestern Polytechnical University (Online)

Aug. 2021, Parallel-in-Time (PinT) Workshop (Online)

Apr. 2021, NVIDIA GTC (Online)

EXPERIENCES

Referee

Nature Cardiovascular Research, Nature Communications, Journal of Computational Physics, Computer Methods in Applied Mechanics and Engineering, Engineering with Computers, International Journal of Heat and Mass Transfer, Scientific Reports

Teaching

· Aug. 2017, Lecturer, Pre-college program, Introduction to Mechanical Engineering, Brown University

Co-Supervising

· Master students: Srinithi Srinivasan (Data Science, JHU)
· Undergraduates: Ojas Chahal (BME, JHU), Noam Rotenberg (BME, JHU)

Extra Training

· Aug. - Oct. 2021, Integrated Medical Sciences III: Cardiovascular, Warren Alpert Medical School, Brown University, RI
· Oct. 2019, Integrating Machine Learning with Multiscale Modeling for Biomedical, Biological, and Behavioral Systems, Bethesda, MD
· Jul. 2019, San Diego Supercomputing Center Summer Institute on High-Performance Computing and Data Science, San Diego, CA