Xinyi Huang

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Positions

Postdoctoral Scholar Research Associate Aug. 2023 – present
Graduate Aerospace Laboratories, Division of Engineering and Applied Science Advisor: Dr. Jane Bae
California Institute of Technology, Pasadena, CA

Education

Ph.D. in Mechanical Engineering Aug. 2018 – May 2023
Department of Mechanical Engineering, College of Engineering Advisor: Dr. Xiang Yang
The Pennsylvania State University, University Park, PA, USA

Bachelor of Engineering, Tsien Excellence in Education Program Aug. 2014 – June 2018
Department of Engineering Mechanics, School of Aerospace Engineering
Tsinghua University, Beijing, China

Journal publications (including under revision)

- Huang, X., & Li, J. J. L. (2024). The characteristics of the meandering effect in a stratified wake. (Under review)
- Huang, X., Chyczewski T., Xia Z., Kunz, R. F., & Yang, X. I. A. (2023). Distilling experience into a physically interpretable recommender system for computational model selection. *Sci. Rep.,* 13, 2225
- Huang, X., Kunz, R. F., & Yang, X. I. A. (2023). Linear Logistic Regression with Weight Thresholding for Flow Regime Classification of a Stratified Wake. *Theor. Appl. Mech. Lett.*, 100414.
- Jain, N., Huang, X., Li, J. J. L., Yang, X. I. A. and Kunz, R. F. (2023). An Assessment of Second Moment Closure Modeling for Stratified Wakes Using Direct Numerical Simulations Ensembles. *J. Fluids Eng.*, 145(9).
- Jain, N., Pham, H. T., Huang, X., Sarkar, S., Yang, X., & Kunz, R. (2022). Second Moment Closure Modeling and Direct Numerical Simulation of Stratified Shear Layers. *J. Fluids Eng., 144*(4), 041102.
- Huang, X., Jain, N., Abkar, M., Kunz, R. F., & Yang, X. I. A. (2021). Determining a priori a RANS model's applicable range via global epistemic uncertainty quantification. *Comput. Fluids, 230*, 105113.
- Huang, X., & Yang, X. I. A. (2021). A Bayesian approach to the mean flow in a channel with small but arbitrarily directional system rotation. *Phys. Fluids*, *33*(1), 015103.
- Lv, Y., Huang, X., Yang, X., & Yang, X. I. (2021). Wall-model integrated computational framework for large-eddy simulations of wall-bounded flows. *Phys. Fluids, 33*(12), 125120.
- Yang, X. I. A., Hong, J., Lee, M., & Huang, X. (2021). Grid resolution requirement for resolving rare and high intensity wall-shear stress events in direct numerical simulations. *Phys. Rev. Fluids*, *6*(5), 054603.

- Kumar, S. S., Huang, X., Yang, X., & Hong, J. (2021). Three dimensional flow motions in the viscous sublayer. *Theor. Appl. Mech. Lett., 11*(2), 100239.
- Huang, X., Yang, X. I. A., & Kunz, R. F. (2019). Wall-modeled large-eddy simulations of spanwise rotating turbulent channels—Comparing a physics-based approach and a data-based approach. *Phys. Fluids*, *31*(12), 125105.
- Yang, X. I. A., Xu, H. H. A., Huang, X., & Ge, M. W. (2019). Drag forces on sparsely packed cube arrays. *J. Fluid Mech.*, *880*, 992-1019.

Experience

Postdoctoral Scholar Research Associate Fall 2023 – present

Bae Research group for computational turbulence, California Institute of Technology, Pasadena, CA, USA

- Analyze numerical error in subgrid scale (SGS) model when combined with wall model, especially commutation errors.

Graduate Research Assistant Fall 2018 – May 2023

Flow Physics and Computational Research Lab, The Pennsylvania State University, University Park, PA, USA

- Focused on the combination of data-driven approach and turbulence research.
  Multiple techniques are used for understanding the physics and for modeling, including the neural network, Bayesian optimization, logistic regression, and recommender system.
  Multiple scenarios are explored to extend modeling abilities, including the rotating flow, the stratified wake, and the separated flows.
- Developed and modified in-house CFD codes under high performance computing/message passing interface environment (HPC/MPI) in C/C++ and FORTRAN.
- Designed and generated computational grid (mesh) according to the simulation requirements, including DNS grid, WMLES grid, WRLES grid and RANS grid.
- Simulated flow under different environments, including with rotation, with stratification and with adverse pressure gradient, in both in-house codes, e.g., LESGO, CharLES, AFiD, NPHASE-PSU and commercial software, e.g., STAR-CCM+.
- Explored routes of applying data-driven tools to improving turbulence modeling behavior, from evaluation of the physics and exploration of the parameter space to augmented models and model selection.

Future Faculty Immersive Teaching Program Fall 2021, Spring 2022 (EDSGN100)

School of Engineering Design, Technology, and Professional Programs, The Pennsylvania State University

- Served as the instructor of record for 3 sections of 3-credit class EDSGN100 on how to be an engineer.
- Closely worked with the teaching team, including other instructors and my TAs, on course improvements.

Graduate Teaching Assistant Fall 2018 & Fall 2019 (ME300), Fall 2020 (ME201)

Department of Mechanical Engineering, The Pennsylvania State University, University Park, PA, USA

- Graded homework and exams for ME300 (Thermodynamics) and ME201 (Introduction to thermo

science);

- Gave review lectures and held office hours for further understanding of the courses.

Visiting student, Department of Mechanical Engineering, The University of Melbourne

Nov. 2017 – Feb. 2018

Undergraduate Visiting Researcher (UGVR) program, Department of Mechanical Engineering, Stanford University June 2017 – Sep. 2017

Skills

- **Programming languages**: MATLAB, FORTRAN, C/C++, Python, LaTeX; git
- **Software**: (Proficient) STAR-CCM+, Pointwise, Tecplot; (Acquainted) OpenFOAM, Solidworks
- **Experimental Technique**: (Acquainted) Hot wire technique, Particle image velocimetry (PIV)

Professional services

Journal referee for

- *Journal of Fluid Mechanics*
- *Journal of Turbulence*
- *Journal of Fluids Engineering*

Selected conference presentations

- Huang, X., Kunz, R., & Yang, X. (2022). Linear logistic regression with weight thresholding for flow regime classification of a stratified wake. *Bulletin of the American Physical Society*.
- Huang, X., Kunz, R., & Yang, X. (2021). Data-driven computational model selection via recommender systems. *Bulletin of the American Physical Society, 66*.
- Huang, X., Jain, N., Kunz, R., & Yang, X. (2020). Epistemic uncertainty quantification of Reynolds stress models. *Bulletin of the American Physical Society*.
- Huang, X., & Yang, X. (2019). Wall-modeled LES of flow around a prolate spheroid at various angles of attack. *Bulletin of the American Physical Society*, *64*.