Meng Li

W105, Engineering Bldg 2, 4726 Calhoun Rd, Houston TX 77204
Email: mli23@uh.edu Telephone: 832-455-4654
Linkedin: https://www.linkedin.com/in/meng-li-a37937185
Github: https://github.com/Sunnyfred/Machine-Learning-Models
Google Scholar: https://scholar.google.com/citations?user=X-CZh2wAAAAJ&hl=en

Background & Research Topics

- **Computational Fluid Dynamics** DNS, LES, and RANS simulations of turbulent flows and multi-phase flows, finite volume and finite difference schemes for discretization, projection method and Helmholtz decomposition algorithm for CFD solver
- **Turbulent Flows with Complex Boundaries** wave-turbulence interactions and boundary layer flow over undulatory boundaries
- **High Performance Computing** High-performance large-scale parallel computing techniques for CFD solvers
- **Machine Learning** Familiar with regression, classification and clustering models (Linear Regression, Logistic Regression, Decision Tree, Random Forest, SVM, Neural Networks, etc.)

Professional Experience

- **Postdoctoral Research Fellow** in Civil and Environmental Engineering ***2021-Present***
  University of Houston, Houston, US
  Advisor: Prof. Mostafa Momen

Education & Qualifications

- **Ph. D.** in Mechanical Engineering ***2016-2020***
  University of Houston, Houston, US **CGPA:3.89/4.00**
  Dissertation Title: "Wave-Resolving Numerical Simulation of Langmuir Circulations"
  Advisor: Prof. Di Yang
- **M. S.** in Engineering Thermophysics ***2013-2016***
  Beihang University (BUAA), Beijing, China **CGPA:4.00/4.00**
  Thesis Title: "Investigation of Wall Modeled Large Eddy Simulation of Turbulent Flow in High Reynolds Number"
- **B. E.** in Aeronautical Engineering ***2009-2013***
  Zhengzhou University of Aeronautics, Zhengzhou, China **CGPA:3.75/4.00**

Research Experiences

University of Houston

Postdoctoral Research Fellow 2021-Present

High-performance Computational Fluid Dynamic Simulations for Urban and Coastal Applications

- Developed ocean wave modules for high-fidelity wave-resolving large eddy simulations of the urban, coastal, and extreme weather applications
- Conducted high-performance simulations using atmosphere model WRF, wave model SWAN, ocean model ROMS, and coupling system COAWST.

Graduate Research Assistant 2016-2020

Aerosol Transport Phenomenon Simulation using Large-Eddy Simulation

- Developed Eulerian-Eulerian multiphase model using LES with a hybrid numerical scheme and simulated transport of aerosolized oil droplets at Marine Atmosphere Boundary Layer
- Applied Finite-Volume method with third-order upwind-scheme for scalar and conservative interpolation for velocity to simulate particle transport phenomenon
- Used Hybrid pseudo-spectral method and finite-difference method to solve turbulent flow, projection method, and iterative solver for mass conservation and pressure Poisson equations

High-fidelity Simulation of the Wave-Turbulence Interaction and the Generation of Langmuir Circulation

- Developed high-fidelity DNS and LES solvers using Fortran, MATLAB, and Python start from scratch to study complex turbulent flows with wavy boundaries
- Deployed solvers on HPC platform (distributed memory MPI) to increase computing efficiency
- Designed post-processing algorithms to evaluate special statistics and identify flow structures
- Analyzed and visualized large simulation data set using Tecplot and Paraview

Beihang University

Graduate Research Assistant *2013-2016*

Numerical Simulation of the Wall-Bounded Turbulent Flows using new LES and RANS Turbulent models

- Designed novel type of RANS/LES turbulent models to simulate wall-bounded turbulent flows, slashed computational costs 40% while ensuring the accuracy and stability of simulations
- Extended the scale-adaptive simulation model (SAS model) to the wall-bounded turbulent flows by introducing into a new 3D Von Karman length scale
- Evaluated and optimized the performance of a one-equation turbulent model (turbulent kinetic energy dependent only, KDO) in wall-bounded flow simulations

Selected Publications

- **Li, M.**, Zhao, Z., Pandya, Y., Iungo, G.V., & Yang, D. (2019), "Large-eddy simulations of oil droplet aerosol transport in the marine atmospheric boundary layer," Atmosphere, vol. 10, 459.
- **Li, M.** & Yang, D. (2019), "Direct numerical simulation and statistical analysis of stress-driven turbulent Couette flow with a free-slip boundary." Physics of Fluids, vol. 31, 085113.
- Hu, X., Lei, L., Qiu, N., Di, Y., and **Li, M**. (2019), "A MapReduce-based improvement algorithm for DBSCAN." Journal of Algorithms & Computational Technology, vol. 12, pp. 53.
- Xu, J., **Li, M.**, & Gao, G. (2017), "A dynamic hybrid RANS/LES approach based on the local flow structure." International Journal of Heat and Fluid Flow, vol. 67, pp. 250-260.
- Song, Y. F., Xu, J., Zhang, Y., **Li, M.** (2017), "Research of Compressible Turbulence Model in Shock Wave/Boundary-Layer Interaction Flow at a Compression Corner." Tuijin Jishu/Journal of Propulsion Technology, vol. 38, pp. 281-288
- Xu, J., **Li, M.**, Zhang, Y., & Chen, L. (2016), "Wall-modeled large eddy simulation of turbulent channel flow at high Reynolds number using the von Karman length scale." Theoretical and Computational Fluid Dynamics, vol. 30, pp. 565-577.

Selected Conference Presentations

- Li, M. & Yang, D., "Wave-resolved direct numerical simulation of the generation of Langmuir circulations under progressive waves," at 72nd American Physical Society Division of Fluid Dynamics Annual Meeting, Seattle, WA, USA, November 25, 2019.
- Li, M., Pandya, Y., Iungo, G.V. & Yang, D., "Large-eddy simulations of oil aerosol plume dispersion in marine atmospheric boundary layer," at Gulf of Mexico Oil Spill & Ecosystem Science Conference, Tampa, FL, USA, February 5, 2020.
- Li, M., Pandya, Y., Iungo, G.V. & Yang, D., "Large-eddy simulations of oil aerosol plume dispersion in marine atmospheric boundary layer," at Gulf of Mexico Oil Spill & Ecosystem Science Conference, Tampa, FL, USA, February 5, 2020.
- Pandya, Y., Li, M., Yang, D. & Iungo, G., "Effects of aerosolized droplets on aerodynamic Roughness in the marine atmospheric boundary layer," at Gulf of Mexico Oil Spill & Ecosystem Science Conference, Tampa, FL, USA, February 5, 2020.
- Pandya, Y., Li, M., Yang, D. & Iungo, G., "Coastal zone wind-wave dynamics in the marine atmospheric boundary layer," at American Geophysical Union Annual Fall Meeting, Online, USA, December 16, 2020.