SHENGQI ZHANG, PH.D.

Assistant Professor/PhD Supervisor
Eastern Institute of Technology, Ningbo, China
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Education

Ph.D. in Fluid Mechanics 09/2018-07/2022
Peking University (Advisor: Prof. Shiyi Chen)

B.S. in Theoretical and Applied Mechanics 09/2014-07/2018
Peking University

Research Experiences

Multiphase flows 09/2018-present
- Introduce spherical harmonics spectra to analyze droplet deformation/breakup in turbulence.

Turbulent rotating flows 09/2018-present
- Use Lagrangian analysis to explain the mean flow scaling of turbulent rotating channel flow.
- Reveal the existence of inertial waves and plumes.
- Analyze abnormal turbulence statistics based on new flow structures.
- Introduce clustering analysis to extract large-scale patterns.
- Enhance heat transfer by controlling large-scale patterns.

Buoyancy-driven flows 09/2018-06/2022
- Determine the correct form of the buoyancy term.
- Introduce locally isothermal sidewalls to modulate flow reversals and enhance heat transfer.

Flow stability analysis 09/2018-05/2020
- Derive analytic linear stability solution of rotating channel flow.
- Develop a CFD-aided Galerkin method for global stability analysis.

Scientific machine learning 09/2018-07/2019
- Recover Darcy's law and Brinkman equation, using LBM simulation data and machine learning.

Surface physics 09/2016-07/2017
- Introduce a multi-layer adsorption model to improve the prediction of porosity distribution.
- Perform adsorption experiments on shale to measure porosity distribution.

Honors & Awards

Excellent PhD Dissertation, Beijing Municipal Education Commission, 2023
Excellent PhD Dissertation, Peking University, 2022
Outstanding Graduate, Peking University, 2022
National Scholarship, Ministry of Education of China, 2020-2021

President's PhD Scholarship, Peking University, 2018-2022

Publications

Refereed papers

Shengqi Zhang*, Chao Sun, (2024). Twin forces: similarity between rotation and stratification effects on wall turbulence. *Journal of Fluid Mechanics*, 979: A45.

Shengqi Zhang, Zhenhua Xia*, Shiyi Chen, (2024). Enhancing large-scale motions and turbulent transport in rotating plane Poiseuille flow. *Journal of Fluid Mechanics*, 979: A43.

Shengqi Zhang, Zhenhua Xia*, Shiyi Chen, (2022). Flow structures in spanwise rotating plane Poiseuille flow based on thermal analogy. *Journal of Fluid Mechanics*, 933: A24.

Shengqi Zhang, Zhenhua Xia*, Shiyi Chen*, (2022). Perturbation analysis of baroclinic torque in low-Mach-number flows. *Journal of Fluid Mechanics*, 930: A4.

Shengqi Zhang, Xin Chen, Zhenhua Xia*, Heng-Dong Xi, Quan Zhou, Shiyi Chen*, (2021). Stabilizing/destabilizing the large-scale circulation in turbulent Rayleigh–Bénard convection with sidewall temperature control. *Journal of Fluid Mechanics*, 915: A14.

Shengqi Zhang, Zhenhua Xia*, Quan Zhou, Shiyi Chen*, (2020). Controlling flow reversal in two-dimensional Rayleigh–Bénard convection. *Journal of Fluid Mechanics*, 891: R4.

Shengqi Zhang, Zhenhua Xia*, Yipeng Shi, Shiyi Chen*, (2019). A two-dimensional-three-component model for spanwise rotating plane Poiseuille flow. *Journal of Fluid Mechanics*, 880: 478-496.

Shengqi Zhang, Zhenhua Xia*, Shiyi Chen, (2021). A CFD-aided Galerkin Method for Global Linear Instability Analysis. *Communications in Computational Physics*, 28(1): 128-147.

Shengqi Zhang, Zhenhua Xia*, (2022). Capturing the Baroclinic Effect in non-Boussinesq Gravity Currents. *Theoretical and Applied Mechanics Letters*, 12(1): 100313.

Qifan Wang, Shengqi Zhang, Yu Zhang, Jiahong Fu, Zhentao Liu*, (2023). Enhancing performance of nanofluid mini-channel heat sinks through machine learning and multi-objective optimization of operating parameters. *International Journal of Heat and Mass Transfer*, 210: 124204.

Jun Lai, Tao Chen, Shengqi Zhang, Zuoli Xiao, Shiyi Chen, Lian-Ping Wang*, (2022). A systematic study of a droplet breakup process in decaying homogeneous isotropic turbulence using a mesoscopic simulation approach. *Journal of Turbulence*, 23(11-12): 567-614.

Liren Li, Yipeng Shi, Shengqi Zhang, Lian-Ping Wang, Zhenhua Xia*, (2019). On the comparison between lattice boltzmann methods and spectral methods for DNS of incompressible turbulent channel flows on small domain size. *Advances in Applied Mathematics and Mechanics*, 11(3): 598-607.

Jin Hu, Shengqi Zhang, Zhenhua Xia*, (2022). Flow field and heat transfer properties in turbulent convection with local heating condition at the bottom wall. *Acta Aerodynamica Sinica*, 40(2): 208-214.

Invited Talks

"Similarity between spanwise rotation and vertical stratification in wall turbulence", *NSFC Key Project Conference*, Jan 2024, Lingshui, China.

"Similarity between spanwise rotation and vertical stratification in wall turbulence", *National*

Conference on Turbulence and Flow Stability, Apr 2023, Ningbo, China.

"Perturbation analysis of baroclinic torque in low-Mach-number flows", *NSFC Key Project Conference*, Jan 2023, Ningbo, China.

"Perturbation Analysis and Perturbative Control of Buoyancy-Driven Flows", *Hong Kong Polytechnic University*, Jan 2023, Hong Kong, China.

"Perturbation analysis of baroclinic torque in low-Mach-number flows", *Central South University*, Nov 2022, Changsha, China.

Academic Part-time Jobs

Reviewer of Journal of Turbulence, Acta Mechanica Sinica