Curriculum Vitae

JIANG, Bin

School of Mechanical Engineering and Mechanics, Xiangtan University

PERSONAL INFORMATION

Date of Birth: January, 1991
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WORKING EXPERIENCE

03/224—Now Lecturer in School of Mechanical Engineering and Mechanics , Xiangtan University
Research Topic: Turbulence, Computational Fluid Dynamics(CFD)
Teaching courses: Fluid Mechanics, CFD

06/2021—01/2024 Postdoc in MAE, Southern University of Science and Technology (SUSTech)
Research Topic: Magnetohydrodynamics(MHD), CFD

EDUCATION BACKGROUND

02/2016—03/2021 Ph.D. in Mechanical Engineering, the University of Melbourne
Research Topic: Flame-wall interaction, autoignition, MILD combustion, Computational Fluid Dynamics
Thesis: Flame-wall interaction for flames diluted with hot combustion products
Advisor: Dr. Robert Gordon, Dr. Mohsen Talei

09/2013—01/2016 M.A. in Thermal Engineering, Northwestern Polytechnical University (NWPU)
Research Topic: Thermodynamics, Hydromechanics, Computational Fluid Dynamics
Overall GPA: 3.76/4. Rank: 5/149

09/2008—07/2012 B.A. in Thermal Energy and Power Engineering, NWPU
Research Topic: Thermodynamics, Hydromechanics
Overall GPA: 3.32/4. Rank: 8/30 (The First Department with Excellent Students)

PUBLICATION

Li C, Yang Y, Matthaeus W H, **Jiang, B.** et al. Non-universality and dissipative anomaly in compressible magnetohydrodynamic turbulence[J]. Journal of Fluid Mechanics, 992: A9, 2024.

Jiang, B., Li, C., Yang, Y.*, Zhou, K., Matthaeus, W.H., Wan, M.*, Energy transfer and third-order law in forced anisotropic MHD turbulence with hyperviscosity. Journal of Fluid Mechanics. 974: A20. 2023.

Jiang B, Gordon R, Talei M. Head-on quenching of laminar premixed methane flames diluted with hot combustion products. Proceedings of the Combustion Institute 37.4 (2019): 5095-5103.

Jiang B, Gordon R, Talei M. Mode-switching behaviour of preheated and diluted flames in a stagnation burner. 11th Asia-Pacific Conference on Combustion, ASPACC 2017. 2017, Vol. 2017-December.

Jiang B, Palulli R, Rivera J, Gordon R, Talei M. CO Emission of Premixed and Diluted Flames in a Stagnation Burner. 20th Australasian Fluid Mechanics Conference (AFMC). Australasian Fluid Mechanics Society. 2016.

Palulli R, **Jiang B**, Rivera J, Gordon R, Talei M. Direct numerical simulation of flame-wall interaction for a forced laminar flame. 20th Australasian Fluid Mechanics Conference (AFMC). Australasian Fluid Mechanics Society. 2016.

Jiang B, et al. A Novel Amphibious Robot [P]. Chinese Patent: 201520309255.6, 2015-08-20.

RESEARCH EXPERIENCE

Energy transfer and third-order law in forced anisotropic MHD turbulence with hyperviscosity (Postdoc)

The Kolmogorov-Yaglom (third-order) law links energy transfer rates in the inertial range of magneto-hydrodynamic (MHD) turbulence with third-order structure functions. Anisotropy, a typical property in the solar wind, largely challenges the applicability of the third-order law with isotropic assumption. To shed light on the energy transfer process in the presence of anisotropy, the present study conducted direct numerical simulations (DNSs) of forced MHD turbulence with normal and hyper-viscosity under various strengths of the external magnetic field (B_0), and calculated three forms of third-order structure function with or without averaging azimuthal or polar angles to B_0 direction. Correspondingly, three forms of estimated energy transfer rates were studied systematically with various B_0. The result shows that the peak of the estimated longitudinal transfer rate occurs at larger scales as closer to the B_0 direction, and its maximum shifts away from the B_0 direction at larger B_0. Compared with normal viscous cases, hyper-viscous cases can attain better separation of the inertial range from the dissipation range, thus facilitating the analyses of the inertial range properties and the estimation of the energy cascade rates. We find that the widespread use of the isotropic form of the third-order law in estimating the energy transfer rates is questionable in some cases, especially when the anisotropy arising from the mean magnetic field is inevitable. In contrast, the direction-averaged third-order structure function properly accounts for the effect of anisotropy and predicts the energy transfer rates and inertial range accurately, even at very high B_0. With limited statistics, the calculation of the third-order structure function shows a stronger dependence on averaging of azimuthal angles than the time, especially at high B_0 cases. These findings provide insights into the anisotropic effect on the estimation of energy transfer rates.

Flame-wall interaction (FWI) for flames diluted with hot combustion products (Ph.D)

- Conducted parametric study of FWI with CHEMKIN stagnation model, including the Carbon-Monoxide CO emissions and combustion modes between the autoignition and premixed flame propagation.
- Conducted 1D Head-on Quenching (HOQ) simulation with DNS code (NTMIX-CHEMKIN) to study the transient FWI, and its impact on CO emissions.
- Simulated 2D laminar FWI with steady and forced conditions to investigate thermal boundary layer (BL) effects on combustion modes and CO emissions.
- 3D turbulent FWI was conducted to study the turbulent BL effects on diluted flames, including the autoignited FWI and premixed propagating FWI.

Design and simulation of a small stream turbine (Master)

- Analyzed internal flow field of the turbine and heat transfer of blade cascades with ANSYS FLUENT;
- Compared simulation results with the experimental data, such as moment, output power and efficiency of the turbine to prove the accuracy and reliability of numerical simulation.

SELECTED SCHOLARSHIPS

2016	**CSC Scholarship from China.** 3000 winners per year in China;
2015	**National Scholarship.** Top: 2%, Rank: 3/149;
2014	**The "WU YA JUN" prize**. Top: 3%, Rank: 5/149;
2013	**Entrance Scholarship for Outstanding Postgraduate.** Top: 2%, Rank: 5/260.

ACTIVITIES & AFFILIATIONS

16/12/2018—21/12/2018	Participating in the first Australian Combustion Summer School.
13/07/2015—21/07/2015	Participating in the 2015 Tsinghua-Princeton Summer School on Combustion, and holding an academic salon about the low pollution combustion technology.

05/2018—04/2019 Vice-president of Chinese Scholar Association in Victoria, AUS

ABILITIES & INTERESTS

Abilities: Proficiency in DNS code, MATLAB, FORTRAN, Python.
Strong coordination and communication abilities

Interests: Run, poems, Taiji