

# Xiao He

Department of Mechanical Engineering, Imperial College London, London, SW7 2AZ

<https://hexfluid.github.io/>

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## RESEARCH OVERVIEW

My research interest in general involves the field of fluid mechanics, data science, and their applications to turbomachinery. Specific research topics include: (1) turbulence modelling for internal flows; (2) compressor aerodynamics: performance optimization, flow instability and flow control; (3) compressor aeroelasticity: non-synchronous vibration; (4) data science

## EDUCATION

09/2018 - present	<b>Imperial College London</b> Department of Mechanical Engineering Topic: Data-Driven Turbulence Modeling Advisor: Prof. Mehdi Vahdati, Prof. Ricardo Martinez-Botas	Doctor of Philosophy
08/2015 – 07/2018	<b>Tsinghua University</b> Department of Automotive Engineering GPA: 3.6/4.0, Rank: 3/60, Topic: Centrifugal Compressor Flow Instability Advisor: Prof. Xinqian Zheng	Master of Science
08/2011 – 07/2015	<b>Tsinghua University</b> Department of Automotive Engineering GPA: 91/100, Rank: 4/74, Honored Graduate	Bachelor of Engineering

## AWARDS AND HONORS

06/2021	Young Engineer Turbo Expo Participation Award	ASME IGTI
10/2020	Henry Lester Trust Grant	Henry Lester Trust
06/2020	Young Engineer Turbo Expo Participation Award	ASME IGTI
06/2019	Student Advisory Committee Travel Award	ASME IGTI
10/2018	President's PhD Scholarship	Imperial College London
12/2017	Tsinghua-IHI Scholarship	IHI Corporation
11/2017	National Scholarship	Ministry of Education of China
07/2017	Japan Student Services Organization Scholarship	Tokyo Institute of Technology
07/2015	Honored Graduate Award	Ministry of Education of China
07/2015	Excellent Bachelor Thesis Award	Tsinghua University
12/2012	1 <sup>st</sup> Prize in the 29 <sup>th</sup> National College Student Physics Competition	Beijing Physics Society
11/2010	1 <sup>st</sup> Prize in the 27 <sup>th</sup> National High School Student Physics Competition	Chinese Physical Society

## TEACHING AND TUTORING EXPERIENCE

### Graduate Teaching Assistant

10/2019 – 06/2021	<b>Fluid Mechanics 2</b> (MECH95003, Imperial) Lead tutorial sessions
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### Tutor for Master Theses / Undergraduate Theses / Research Intern

01/2021 – 06/2021	<b>Guangnan Jia</b> (M.S., Imperial) Intern: Uncertainty Quantification of Turbulence Inlet Boundary Condition for Separated Compressor Flows
11/2020 – 06/2021	<b>Khawaja Muhammad Affan</b> (M.E., Imperial, co-supervised with Prof. Mehdi Vahdati) Master thesis: Machine Learning Assisted Turbulence Modelling for Shock-Boundary Layer Interaction Flows
07/2020 – 06/2021	<b>Zhou Fang</b> (B.E., XJTU, co-supervised with Prof. Mehdi Vahdati) Intern: Reduced Order Model of RANS Using Mode Decomposition and Machine Learning
01/2020 – 06/2020	<b>Jianheng Tan</b> (M.E., Imperial, co-supervised with Prof. Mehdi Vahdati) Master thesis: Machine Learning Assisted Turbulence Modelling for Transonic Bump Flows
01/2018 – 06/2018	<b>Zitian Niu</b> (B.E., USTB, co-supervised with Prof. Xinqian Zheng) Bachelor thesis: Vaned Diffuser for Centrifugal Compressors

01/2017 – 06/2017      **Wenchao Zhang** (B.E., Tsinghua, co-supervised with Prof. Xinqian Zheng)  
 Bachelor thesis: Synthetic Jet for Centrifugal Compressors

01/2016 – 06/2016      **Jie Wei** (B.E., Tsinghua, co-supervised with Prof. Xinqian Zheng)  
 Bachelor thesis: Tandem Diffuser for Centrifugal Compressors

## PUBLICATIONS

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I have authored/co-authored 12 peer-reviewed journal papers and 7 peer-reviewed conference papers, including 4 papers as the lead author in ASME Journal of Turbomachinery, ASME Journal of Fluids Engineering, and AIAA Journal of Propulsion and Power. My Google Scholar statistics are: Citation $\geq$ 103, h-index $\geq$ 7, i10-index $\geq$ 4. Selected five publications of each research topic are as follows. (\*: corresponding author)

### Turbulence Modelling for Internal Flows

- [1] **He, X.\***, Tan, J., Vahdati, M., Rigas, G., “Towards Explainable Machine Learning Assisted Turbulence Modelling for Transonic Flows,” (under review).
- [2] **He, X.\***, Zhao, F., and Vahdati, M., “Detached Eddy Simulation: Recent Development and Application to Compressor Tip Leakage Flow,” ASME Journal of Turbomachinery (accepted).
- [3] **He, X.\***, Zhao, F., and Vahdati, M., “Uncertainty Quantification of Spalart-Allmaras Turbulence Model Coefficients for Compressor Stall,” ASME Journal of Turbomachinery, 2021, 143(8), 081007.
- [4] **He, X.\***, Zhao, F., and Vahdati, M., “Uncertainty Quantification of Spalart-Allmaras Turbulence Model Coefficients for Simplified Compressor Flow Features,” ASME Journal of Fluids Engineering, 2020, 142(9), 091501.
- [5] **He, X.\***, Zhao, F., and Vahdati, M., “Evaluation of Spalart-Allmaras Turbulence Model Forms for a Transonic Axial Compressor,” GPPS Paper No. GPPS-CH-2020-0013.

### Compressor Aerodynamics

- [1] **He, X.**, and Zheng, X., “Roles and Mechanisms of Casing Treatment on Different Scales of Flow Instability in High Pressure Ratio Centrifugal Compressors,” Aerospace Science and Technology, 2019, 84, 734-746.
- [2] **He, X.**, and Zheng, X., “Flow Instability Evolution in High Pressure Ratio Centrifugal Compressor with Vaned Diffuser,” Experimental Thermal and Fluid Science, 2018, 98, 719-730.
- [3] **He, X.**, and Zheng, X., “Performance Improvement of Transonic Centrifugal Compressors by Optimization of Complex Three-Dimensional Features,” IMechE, Part G: Journal of Aerospace Engineering, 2017, 231(14), 2723-2738.
- [4] **He, X.**, and Zheng, X., “Mechanisms of Lean on the Performance of Transonic Centrifugal Compressor Impellers,” AIAA Journal of Propulsion and Power, 2016, 32(5), 1220-1229.
- [5] **He, X.**, Zheng, X., Wei, J., and Zeng, H., “Investigation of Vaned Diffuser Splitters on the Performance and Flow Control of High Pressure Ratio Centrifugal Compressors,” ASME Paper No. GT2016-56255.

## PROFESSIONAL SERVICES

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### Referee for Journals

Aerospace Science and Technology  
 International Journal of Mechanical Sciences  
 IMechE Journal of Power and Energy  
 IMechE Journal of Automobile Engineering  
 IMechE Journal of Aerospace Engineering  
 Advances in Mechanical Engineering

### Referee for Conferences

ASME Turbo Expo, GPPS Conference

### Membership

ASME (ID: 000101977824)  
 AIAA (ID: 937472)  
 APS (ID: 62075782)

## MISCELLANEOUS

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Homeless animal charity volunteer; Amateur hiker

## REFERENCES

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Prof. Mehdi Vahdati, [m.vahdati@imperial.ac.uk](mailto:m.vahdati@imperial.ac.uk), +44 (0)20 7594 7073, Department of Mechanical Engineering, Imperial College London, UK  
 Dr. Georgios Rigas, [g.rigas@imperial.ac.uk](mailto:g.rigas@imperial.ac.uk), +44 (0)20 7594 5065, Department of Aeronautics, Imperial College London, UK