




Junhao Ke

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Faculty of Engineering and Information Technology
The University of Sydney
New South Wales 2006

Education

The University of Sydney

NSW, Australia

Doctor of Philosophy

March 2017 – May 2021

Thesis: Direct numerical simulation of an unsteady natural convection boundary layer

Advisors: Dr. Nicholas Williamson & Prof. Steven Armfield

The University of Sydney

NSW, Australia

Master of Professional Engineering

March 2015 – December 2016

Advisors: Dr. Nicholas Williamson & Prof. Steven Armfield

East China University of Science and Technology

Shanghai, China

Bachelor of Engineering

September 2010 – July 2014

Research Interests

Buoyant Driven Flows, Heat Transfer, Computational Fluid Dynamics, Statistical Computing,
Turbulence, Boundary Layer Theory

Publications

Ke, J., Williamson, N., Armfield, S. W., & Komiya, A. (2023). The turbulence development of a vertical natural convection boundary layer. *Journal of Fluid Mechanics*, xxx, xx.

Ke, J., Williamson, N., Armfield, S. W., Komiya, A., & Norris, S. E. (2021). High Grashof number turbulent natural convection on an infinite vertical wall. *Journal of Fluid Mechanics*, 929, A15.

Ke, J., Williamson, N., Armfield, S. W., Norris, S. E., & Komiya, A. (2020). Law of the wall for a temporally evolving vertical natural convection boundary layer. *Journal of Fluid Mechanics*, 902, A31.

Ke, J., Williamson, N., Armfield, S. W., McBain, G. D., & Norris, S. E. (2019). Stability of a temporally evolving natural convection boundary layer on an isothermal wall. *Journal of Fluid Mechanics*, 877, 1163-1185.

Ke, J., Williamson, N., Armfield, S. W., Norris, S. E., & Kirkpatrick, M. (2018). Direct numerical simulation of a temporally developing natural convection boundary layer on a doubly-infinite isothermal wall, *In Proceedings of IHTC-16. Begell House.*

Work in Progress

Ke, J., Williamson, N., Armfield, S. W., & Komiya, A. Non-Boussinesq effects on the natural convection flows. (Manuscript in Prep.)

Conferences & Talks

The classical turbulent regime and Grashof number influences on the turbulence statistics of an unsteady natural convection boundary layer. In 23rd Australasian Fluid Mechanics Conference, Sydney, NSW Australia, 4-8 December 2022

Keynote: On the classical and ultimate turbulent regimes of a natural convection boundary layer, In 12th Australasian Heat and Mass Transfer Conference, Sydney, NSW Australia, 30 June-1 July 2022

Turbulence statistics in a temporally evolving turbulent natural convection boundary layer. In 18th International Conference on Flow Dynamics, Sendai, Miyagi Japan, 28-29 October 2021.

Integral modelling of an unsteady natural convection boundary layer. In 22nd Australasian Fluid Mechanics Conference, Brisbane, QLD Australia, 7-10 December 2020.

Application of an integral model to an unsteady natural convection boundary layer. In 11th Australasian Natural Convection Workshop, Sydney, NSW Australia, 9-10 December 2019.

DNS of a temporally evolving vertical natural convection boundary layer. In 17th European Turbulence Conference, Torino, Italy, 3-6 September 2019.

Invited talk: DNS study of a parallel vertical natural convection boundary layer. In Australia-Japan Fluid Dynamics Workshop, Sydney, NSW Australia, 31 January-1 February 2019.

Invited talk: On the numerical simulation of a natural convection boundary layer on a doubly-infinite isothermal wall. In the Centre of Wind, Waves and Water, Sydney, NSW Australia, 22 June 2018.

Direct numerical simulation of a temporally developing natural convection boundary layer on a doubly-infinite isothermal wall. In 16th International Heat Transfer Conference, Beijing, China, 10-15 August 2018.

Direct numerical simulation of an unsteady natural convection boundary layer adjacent to a doubly-infinite isothermal wall. In 10th Australasian Natural Convection Workshop, Auckland, New Zealand, 30 November-1 December 2017.

Honors & Awards

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| Postgraduate Research Support Scheme , Faculty of Engineering and IT, USyd | <i>2018, 2020, 2021</i> |
| Charles Kolling Travelling Fund , Faculty of Engineering and IT, USyd | <i>2019</i> |
| Best Student Paper Award in 10th Australasian Natural Convection Workshop | <i>2017</i> |
| Natural Convection Supplementary Scholarship , Faculty of Engineering and IT, USyd | <i>2016</i> |
| USyd-IS Strategic Scholarship Award , USyd | <i>2016</i> |
| Dean's Excellency Award , Faculty of Engineering and IT, USyd | <i>2015</i> |
| Merit Academic Award , Faculty of Engineering and IT, USyd | <i>2015</i> |
| Third Prize Scholarship , East China University of Science and Technology | <i>2014</i> |
| Fei-yang Award , East China University of Science and Technology | <i>2014</i> |

Teaching Experience

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| Lecturer/Unit of Study Coordinator | <i>February 2022 – Present</i> |
| Faculty of Engineering and IT, USyd | NSW |
| <ul style="list-style-type: none"> Deliver lectures and coordinate the UoS. This includes providing the teaching materials and resources, as well as administering the assessments. Course includes: Engineering Analysis/Biomedical Engineering II/Biomedical Engineering Mathematical Modelling (AMME2000/BMET2960/BMET9960) | |
| Teaching Assistant | <i>March 2017 – Present</i> |
| Faculty of Engineering and IT, USyd | NSW |
| <ul style="list-style-type: none"> Deliver tutorial and lead discussion sessions to reinforce material covered in lectures. Supervise quizzes and evaluate student assignments, quizzes, exams, and other assessments. Course includes: Fluid Dynamics II (MECH3261), Thermal Engineering II (MECH3260), Advanced Computational Fluid Dynamics (AMME5202) | |

Research Experience

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|---|--------------------------------------|
| Postdoctoral Research Associate | <i>March 2021 – Present</i> |
| School of Aerospace, Mechanical and Mechatronic Engineering, The University of Sydney | NSW, Australia |
| <ul style="list-style-type: none"> Turbulent flows; Direct numerical simulation; Buoyancy induced flows; Boundary layers | |
| Visiting Researcher | <i>September 2019 – October 2019</i> |
| Advanced Fluid Information Research Center, Institute of Fluid Science, Tohoku University | Sendai, Japan |
| <ul style="list-style-type: none"> International cooperation on the natural convection/ventilation project | |

Industry Experience

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| Project Engineer | <i>November 2015 – February 2016</i> |
| Department of Research & Development, Inalfa Co., Ltd. | Shanghai, China |
| <ul style="list-style-type: none"> Experiment design & validation | |

- Statistical analysis for experimental data
- Algorithm development for acoustic analysis programs

Assistant Manager

Department of Construction & Excavation Machinery, Yanmar Engines Co.,

June 2014 – December 2014

Shanghai, China

- Statistical analysis for recurrent event data
- Inventory control

Service

Volunteer of China Open Day (USyd)

2015

- Provide assistance on behalf of the faculty of Engineering and IT with the USyd global student recruitment team.

Language

English (fluent), **Japanese** (fluent), **Mandarin** (native) and **Shanghai Dialect** (native)