




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*, 964, A24. (Also featured in *Focus on Fluids*, Andrew J. Wells. (2023). From classical to ultimate heat fluxes for convection at a vertical wall, *Journal of Fluid Mechanics*, 970, F1.)

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*.

Contributions

Peer review for *Journal of Fluid Mechanics*: 02-Apr-2023, 01-Aug-2023.

Work in Progress

Ke, J., Williamson, N., Armfield, S. W. Temperature-dependent fluid property effects on the linear stability of a vertical natural convection boundary layer. (Submitted to *Journal of Fluid Mechanics*)

Conferences & Talks

From the classical regime to the ultimate regime of natural convection: turbulence structure evolution and near-wall streaks. In American Physics Society, Annual meeting of the Division of Fluid Dynamics, Washington DC, 19–21 November, 2023.

Variable property effects on the boundary layer stability of a vertical natural convection. In 12th Australasian Natural Convection Workshop, Melbourne, VIC Australia, November 2023

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.

Research Experience

Postdoctoral Research Associate	<i>March 2021 – Present</i>
School of Aerospace, Mechanical and Mechatronic Engineering, The University of Sydney	NSW, Australia

Visiting Researcher	<i>September 2019 – October 2019</i>
Advanced Fluid Information Research Center, Institute of Fluid Science, Tohoku University	Sendai, Japan

Teaching Experience

Lecturer/Unit of Study Coordinator	<i>February 2022 – Present</i>
Faculty of Engineering and IT, USyd	NSW

- 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

- 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)

Industry Experience

Project Engineer	<i>November 2015 – February 2016</i>
Department of Research & Development, Inalfa Co., Ltd.	Shanghai, China

Assistant Manager	<i>June 2014 – December 2014</i>
Department of Construction & Excavation Machinery, Yanmar Engines Co.,	Shanghai, China

Honors & Awards

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>

Service

Volunteer of China Open Day (USyd)	<i>2015</i>
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Language

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