




# Junhao Ke

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

## Education

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**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

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

## Publications

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**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*)

**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*.

## Scientific Service

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

## Conferences & Talks

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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.

**Invited Keynote:** Variable property effects on the boundary layer stability of a vertical natural convection. In 12th Australasian Natural Convection Workshop, Melbourne, VIC Australia, 30 November-1 December 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

**Invited 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

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

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

## Teaching Experience

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<b>Lecturer/Unit of Study Coordinator</b>	<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)

<b>Teaching Assistant</b>	<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)

## Honors & Awards

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