




# 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., & 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

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

## Work in Progress

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

## Conferences & Talks

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In American Physics Society, Annual meeting of the Division of Fluid Dynamics, Washington DC, 19–21 November, 2023.

Temperature-dependent fluid properties on the 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

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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)

## Industry Experience

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

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

## 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>

#### Service

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

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<b>English</b> (fluent), <b>Japanese</b> (fluent), <b>Mandarin</b> (native) and <b>Shanghai Dialect</b> (native)
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