UNSW CANBERRA

13th Australasian Natural Convection Workshop

1-2 December 2025

Hosted by UNSW Canberra

AUSTRALASIAN FLUID MECHANICS SOCIETY

CANBERRA INNOVATION NETWORK

This program has been prepared by Dr Krishna Talluru, School of Engineering and Technology, UNSW Canberra.

For further information:

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Foreword

The Australasian Natural Convection Workshop is distinctive in its dedicated focus on natural and mixed convection problems. Its small scale and well-defined scope provides an informal yet highly informed forum for the discussion of flow physics, applications, and experimental, numerical, and analytical approaches to natural convection.

The **13th Australasian Natural Convection Workshop** continues this tradition. This year, the organising committee accepted **25 extended abstracts** from **9 institutions**, with contributions from **Australia, New Zealand, Japan, China, and Spain**. As in previous years, the presentations cover a wide range of topics related to natural and mixed convection. Several contributions focus on canonical flows such as vertical natural convection boundary layers over smooth and rough surfaces, Rayleigh–Bénard convection, horizontal convection, and plumes. A number of submissions also explore diverse applications, from large-scale environmental convection problems associated with built environment and oceans. Novel modelling techniques and experimental approaches are also represented. Notably, only six of the 25 submissions employ experimental methods—perhaps reflecting the experimental challenges in studying natural convection and a broader shift in fluid mechanics research toward numerical approaches.

This year marks the **first time the biennial workshop is being hosted by UNSW Canberra** since the inaugural meeting held at CSIRO in 1984. The workshop has previously been organised by:

- CSIRO – Highett (1984)
- The University of New South Wales (1987)
- Monash University (1990)
- The University of Western Australia (1993)
- The University of Sydney (1996)
- Murdoch University (1999)
- The University of Sydney (2003)
- The University of Sydney (2013)
- Monash University (2015)
- The University of Auckland (2017)
- The University of Sydney (2019)
- The University of Melbourne (2023)

We look forward to welcoming you all to Canberra and to fostering the open discussion and exchange of ideas that have long been the characteristic feature of this workshop series.

On behalf of the organising committee,

Chair: Krishna Talluru

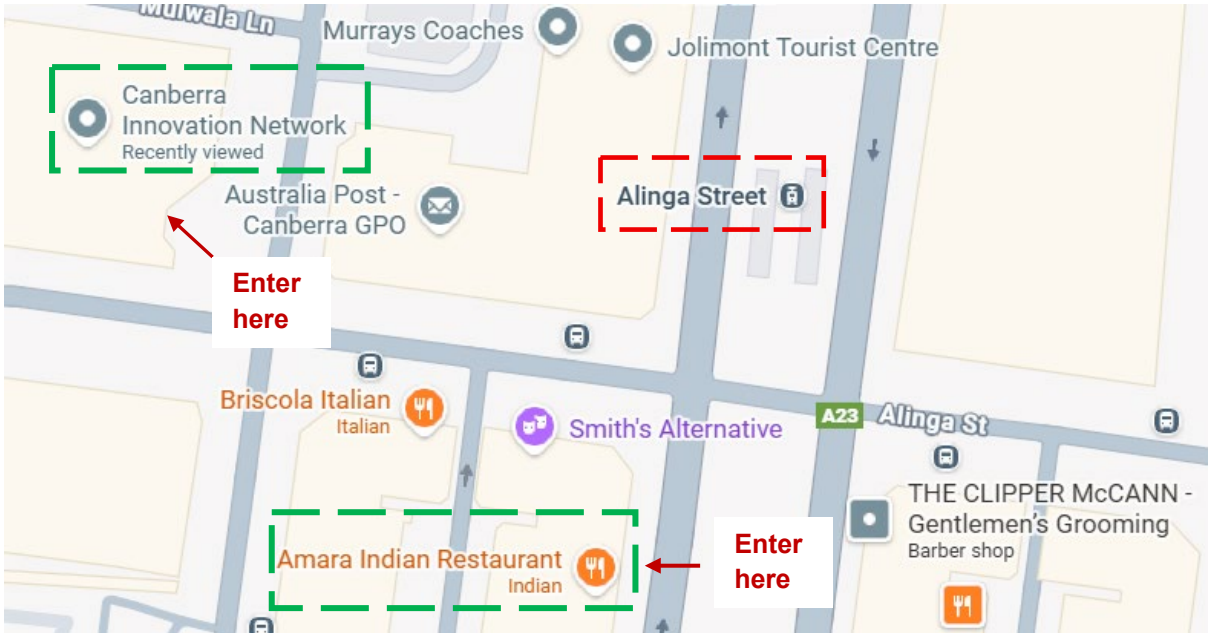
Co-chair: Fangbao Tian

Workshop Venue

The 13th ANCW will be held at the Canberra Innovation Network, which is located on Level 5, 1 Moore Street in the heart of Canberra. See the map below for entry to the CBRIN building.

Workshop dinner

The workshop dinner will be held at Amara Restaurant (http://www.rubyos.com.au) at 51-53 Northbourne Avenue. The dinner starts from 18.00 on Monday 1st December. See the map below for the entry to restaurant.



Internet Access

Wireless internet will be available at the venue. The details will be provided during the workshop.

Information for Speakers

The keynote session talks are 45 minutes with 10-15 minutes for questions, while other talks will be 15 minutes followed by 5 minutes of questions and discussion time. To ensure smooth running of the sessions, speakers are asked to preload their talks onto the PC during the breaks. If you intend to use your own laptop then please test this prior to the session.

Catering

Morning Tea/coffee, Lunch and Afternoon Tea/coffee and snacks will be provided in the session breaks.

Best Student Presentation Award

In order to encourage research students to participate in the workshop, we will present an award to the best student presentation. A small committee will be formed to judge the presentations.

Registered Participants

First name	Last name	Affiliation
Timothy	Anderson	Charles Sturt University
Steve	Armfield	The University of Sydney
Charbel *	Bassil	The University of Melbourne
Aditya *	Chaudhary	The University of Sydney
Keyi *	Chen	The University of Sydney
Bajrang *	Chidhambaranathan	The University of Melbourne
Wangpeng *	Gui	The University of Melbourne
Sivakunalan *	Inparaja	The University of Melbourne
Chinthaka	Jacob	The University of Melbourne
Siyu *	Ji	The University of Sydney
Junhao	Ke	The University of Sydney
Dhiraj *	Kumar	The University of Sydney
Wai Kit *	Lam	The University of Melbourne
Joy *	Lee	The University of Melbourne
Chengwang	Lei	The University of Sydney
Dehai *	Liu	The University of Sydney
Jinshuyang *	Lu	The University of Sydney
Zhiman *	Luan	Beijing Institute of Technology
Michael	MacDonald	The University of Auckland
Krishna Reddy	Maryada	The University of Auckland
Quang Duy *	Nguyen	The University of Sydney
Stuart	Norris	The University of Auckland
Andrew	Ooi	The University of Melbourne
Jordi	Pallares	Rovira i Virgili
Jimmy	Philip	The University of Melbourne
Hong *	Ren	UNSW Canberra
Kial	Stewart	The Australian National University
Krishna	Talluru	UNSW Canberra
Fang-Bao	Tian	UNSW Canberra
Victoria	Timchenko	UNSW Sydney
Svetlana	Tkachenko	UNSW Sydney
Thomas *	Valentini	The University of Melbourne
Cat	Vreugdenhil	The University of Melbourne
Nicholas	Williamson	The University of Sydney
Feng	Xu	Beijing Jiaotong University
Miao *	Zhang	The University of Sydney

* indicates student participant

Technical Program – Day1

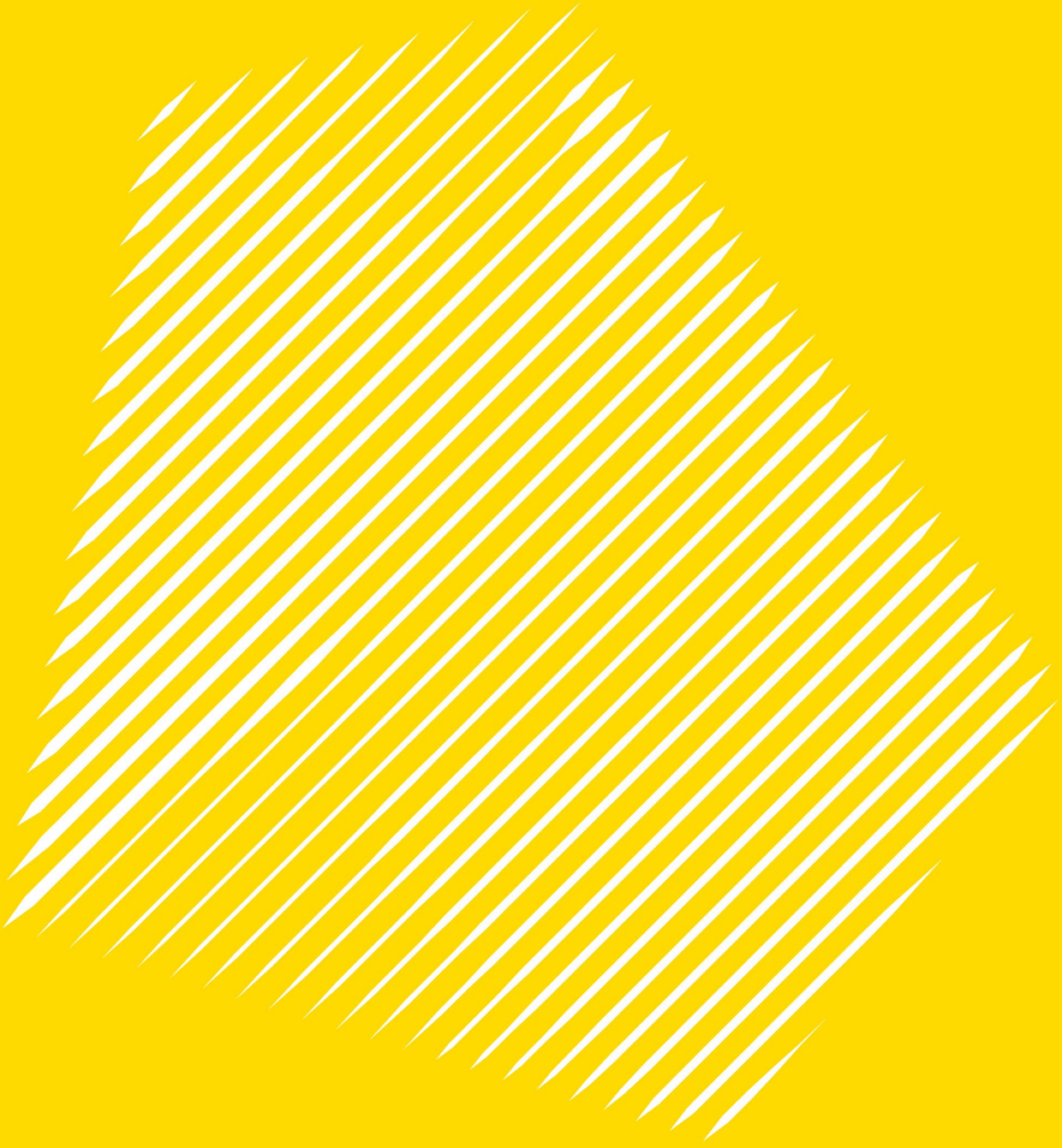
8:00-9:00		**Registration and Welcome session**	
9:00-9:10		**Opening session and Introduction to CBRIN**	
		Keynote 1	**Chair: Stuart Norris**
9:10-10:10	*1*	A reflection on the contributions of Professor John Clifford Patterson	**Steve Armfield** and **Chengwang Lei**
10:10-10:40		**Morning Tea**	
		Session 1A	**Chair: Michael MacDonald**
10:40-11:00 *	*2*	Drivers of Southern Ocean as Revealed by Convection-Resolving Direct Numerical Simulations	**Bajrang Chidhambaranathan**, Bishakhdatta Gayen and Catherine A. Vreugdenhil
11:00-11:20 *	*3*	Capabilities of Neural Ordinary Differential Equations in Learning and Predicting Gravity Current Flows	**W. K. Lam**, A. Heshmati, W. Lu, T. Zahtila, L. Chan, S. J. Zhu, R. Manasseh and A. Ooi
11:20-11:40 *	*4*	DNS study of the streamwise development of natural convection boundary layers for Pr = 2 and Pr = 6	**Jinshuyang Lu**, A. Komiya, S.W. Armfield and Junhao Ke
11:40-12:00 *	*5*	Using a Louvre to Enhance Solar Chimney Performance for Building Ventilation	**Miao Zhang** and Chengwang Lei
12:00-12:20 *	*6*	Trapped Wave Drag from a 2D Obstacle in a Stratified Flow: Theory & Experiments	**Thomas Valentini**, Joseph Klewicki, and Jimmy Philip
12:20-13:20		**Lunch**	
		Keynote 2	**Chair: Andrew Ooi**
13:20-14:20	*7*	Buoyancy in the dispersion of aerosols exhaled during violent expiratory events	**Jordi Pallares**
		Session 1B	**Chair: Jimmy Philip**
14:20-14:40 *	*8*	Double-diffusive convection in two-layer viscoelastic fluid systems	**Zhiman Luan**, Chen Yin, Stuart Norris and Ye Zhang
14:40-15:00 *	*9*	Propagation of Perturbations in a Vertical Air Flow Channel with Uniformly and Symmetrically Heated Sidewalls	**Siyu Ji**, Quang Duy Nguyen and Chengwang Lei
15:00-15:20 *	*10*	The Influence of Convection and Rotation on Downslope Flow over a Continental Shelf	**Sivakunalan Inparaja**, Catherine A. Vreugdenhil and Bishakhdatta Gayen
15:20-15:50		**Afternoon Tea**	
		Session 1C	**Chair: Cat Vreugdenhil**
15:50-16:10 *	*11*	Estimating the basal melting of ice shelves affected by submesoscale ocean dynamics	**Wangpeng Gui**, Ankit Bhadouriya, Catherine A. Vreugdenhil and Bishakhdatta Gayen
16:10-16:30 *	*12*	Experimental Observation of Swinging Motion of a Suspended Circular Cylinder near a Vertical Heated Plate	**Quang Duy Nguyen**, Siyu Ji and Chengwang Lei
16:30:16:50 *	*13*	Analysis of Vertical Natural Convection using β-Variational Autoencoders	**Jiyoung Lee**, Tony Zahtila, Wilson Lu, Wai Kit Lam, Leon Chan, Richard Sandberg and Andrew Ooi
16:50-17:10 *	*14*	Turbulent variances approaching free convection in the atmospheric boundary layer	**Aditya Chaudhary** and Michael Heisel
17:10-17:30 *	*15*	Turbulence Propagation and Entrainment Across Density Interfaces in Oscillating Grid Stratified Flows	**Charbel Bassil**, Manikandan Balasubramaniyan, Joseph Klewicki and Jimmy Philip
18:00-21:00		**Dinner at Amara Restaurant**	

* indicates student participant

Technical Program – Day2

9:00-9:10		**House keeping**	
		Keynote 3	**Chair: Chengwang Lei**
9:10-10:10	*16*	A Jet Induced Radial Flow on A Heated Circular Plate	**Feng XU**
10:10-10:40		**Morning Tea**	
		Session 2A	**Chair: Junhao Ke**
10:40-11:00	*17*	An examination of unwalled agricultural shading structures under calm wind conditions	**T. N. Anderson**
11:00-11:20 *	*18*	Effect of Radiation on the Thermal Performance of Triangular-Fin Heat Sinks	**Dehai Liu**, Chengwang Lei, Grant P Steven and Qing Li
11:20-11:40	*19*	A Natural Convection Perspective on the Atlantic Meridional Overturning Circulation	**Chinthaka Jacob**, Bishakhdatta Gayen and Catherine A. Vreugdenhil
11:40-12:00	*20*	Bio-inspired geometries in mitigating the fire-enhanced wind load of a low-rise building	Seyed Mohsen Hashem Zadeh, Li Wang, John Young and **Fang-Bao Tian**
12:00 -12:20 *	*21*	Temperature distribution on inclined roof-mounted PV modules under free convection conditions: A numerical study	**Svetlana Tkachenko**, Victoria Timchenko
12:20 – 13:20		**Lunch**	
		Keynote 4	**Chair: Nicholas Williamson**
13:20-14:20	22	Natural and forced convection turbulent boundary layer along a melting vertical ice face	**Jimmy Philip**
		Session 2B	**Chair: Steve Armfield**
14:20-14:40	*23*	The Effects of Surface Temperature and Salinity on Convection in the Atlantic Meridional Overturning Circulation	**Catherine A. Vreugdenhil**, Bahman Ghasemi, Taimoor Sohail and Bishakhdatta Gayen
14:40-15:00	*24*	Shear-Dominated Turbulence in a Vertical Buoyancy Layer	**K. R. Maryada**, S. W. Armfield, P. Dhopade, M. MacDonald and S. E. Norris
15:00-15:20	*25*	On the role of Prandtl number in vertical natural convection	**Junhao Ke**, A. Komiya, S. W. Armfield and N. Williamson
15:20:15:40	*26*	How will polar amplification change standing Rossby waves?	**Kial D. Stewart**, Callum J. Shakespeare & Thomas G. Schmaltz
15:40-16:10		**Afternoon Tea**	
16:10:16:30		Closing Session and Award Presentation	

* indicates student participant



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