



AUSTRALASIAN
FLUID
MECHANICS
SOCIETY

NEWSLETTER – No. 10

August 2017

Welcome to the tenth newsletter of the Australasian Fluid Mechanics Society. December 2016 brought with it the 20th Australasian Fluid Mechanics Conference (20AFMC) in Perth, hosted by the University of Western Australia. It was universally agreed that this was a highly successful event that ran like clockwork and delivered a high-quality experience for all participants; a report of the event is provided below. Under its president Hugh Blackburn, newly re-elected in December 2016, the AFMS committees have been active on a number of fronts, some of which are described in this newsletter. The AFMS finances are very sound, supplemented by membership fees from the 20AFMC and this provides greater scope for the Society to support its members and various Fluid Mechanics meetings and symposia as well as improved opportunities for research students who represent the future of the Australasian Fluid Mechanics community.

NEWS

20AFMC Report

The 20th Australasian Fluid Mechanics Conference attracted a total of 340 delegates to Perth in December for four days of presentations and cordial discussion. The University of Western Australia was fortunate to host the conference – which returned to Western Australia for the first time in more than 50 years. The conference comprised 7 keynote presentations and 293 standard presentations, of which 142 were delivered by students. The presentations covered 25 themes in fluid mechanics and were delivered by researchers from 16 different countries, with China, Japan and the US contributing the largest share of international participants.

The Local Organising Committee members are very thankful to the supporters and sponsors of the conference, as well as the Australasian Fluid Mechanics Society who provided excellent support to ensure the success of the conference. On reflection it was

excellent to see the AFMC back in Perth and plans are well and truly in place to see it return before 2066! (Report provided by Scott Draper)



Greg Ivey, Chair of the 20AFMC, welcoming delegates to the conference banquet

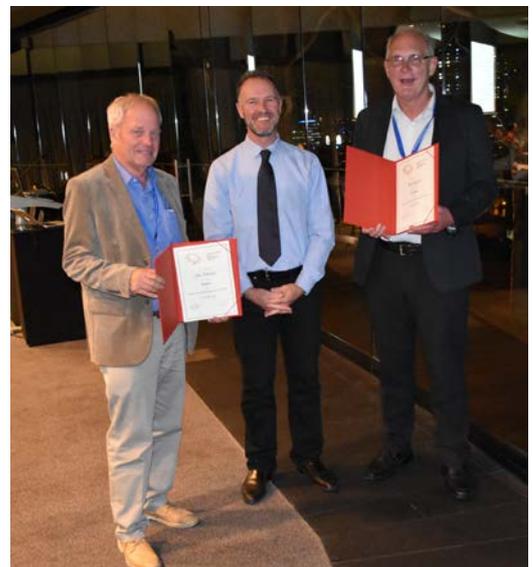


Delegates at the 20AFMC (zoom the image to find yourself!)

Newly Elected Fellows of the AFMS

Through its rigorous nomination and screening process the AFMS is delighted to announce the election of two new (life) fellows to the Society in 2016, namely Professors John Patterson and Phil Schwarz. John and Phil received their fellowship certificates at the 20AFMC banquet warmly applauded by the very significant proportion of the Australasian Fluid Mechanics community in attendance.

John (left) and Phil (right) awarded their fellowships by AFMS President Hugh Blackburn (centre)



Best Paper-presentation Prizes at the 20AFMC

The AFMS supported the award of three student paper-presentation prizes at the 20AFMC. These awards are judged by members of the AFMS Council, the AFMC LOC, session chairs and selected senior researchers attending the conference. The winners were as follows.



Left:

Winner **M.R. Abbassi** (Melbourne U.) receives the **Tony Perry prize** from Ivan Marusic for his paper entitled 'Drag reduction via large-scale opposition flow control in a high Reynolds number turbulent flow'.

Centre:

Winner **C.S. Ng** (Melbourne U.) receives the **Sam Luxton prize** from Richard Kelso for his paper entitled 'Potential energy in vertical natural convection'.

Right:

Winner **A. Sareen** (Monash U.) receives the **David Wilkinson prize** from Roger Nokes for her paper entitled 'Vortex induced vibration of a transversely rotating sphere'.

Student-participation Awards for the 20AFMC

Congruent with its core mission, the AFMS introduced a set of awards designed to enable student participation in the AFMC series. The awards provide a registration-fee waiver and are judged on criteria that include: quality of the submitted paper, statement of need, a cost-breakdown of attendance and a supporting statement from the student's research supervisor. For the 20AFMC, 34 applications were received and judged by a panel comprising members of the Local Organising Committee and AFMS Council members on the student-prizes subcommittee. The following award recipients are congratulated:

- Prasad Cheema (Sydney U.)

- Jaingang Chen (Harbin Institute of Technology / UWA)
- Jagmohan Singh (Monash U.)
- Vishal Chaugule (Curtin U.)
- Keelan O'Neill (UWA)
- Hongyi Jiang (UWA)
- Alan Green (Wollongong U.)
- Maththew Emes (Adelaide U.)
- Yao Tao (RMIT)

Fluid Mechanics Short Video Competition

The AFMS held its first short (4-minutes maximum) video competition in conjunction with the 20AFMC. The competition was organized by the AFMS Outreach Sub-Committee and particularly through Shaun Chan's work. It was open to undergraduate and research students wishing to showcase their work in an engaging and accessible (to non-experts) way as well as projecting the fun and beauty of Fluid Mechanics. The winners were:

1st Prize (\$500): *Dancing with the Stars*

A smoothed particle hydrodynamics simulation of two stars undergoing the common envelope interaction.

Video created by Thomas Reichardt, mentored by Orsola De Marco, Macquarie University.

2nd Prize (\$300): *Turbulence in a linearly stratified body of fluid*

When disturbance is created by an oscillating grid into a linearly stratified body of fluid, a special instability can be observed.

Video created by Scott Becker, Yanik Salgadoe, Imran Vilcassim, Ceser Daguet; mentored by Jimmy Philip, University of Melbourne.

3rd Prize (\$200): *Visualisation of wake flow induced by a moving manikin*

CFD and Experimental techniques used for flow visualisation.

Video created by Yao Tao, mentored by Kiao Inthavong, RMIT.

The winning videos were screened at the opening ceremony of the 20AFMC and can also be viewed on the AFMS website at: <http://afms.org.au/gallery.html>

ANNOUNCEMENTS

AFMS Council and Sub-committees

The results of the (online) election for membership of the AFMS Council and Executive Committee members were announced at the 2016 AGM of the Society held during the 20AFMC. The outcomes are as follow.

Executive committee

Hugh Blackburn	(President)	[hugh.blackburn@monash.edu]
Richard Manasseh	(Vice-President)	[rmanasseh@swin.edu.au]

Ivan Marusic	(Treasurer)	[imarusic@unimelb.edu.au]
Tony Lucey	(Secretary)	[t.lucey@curtin.edu.au]

Elected council members

Steve Armfield	[armfield@aeromech.usyd.edu.au]
Greg Ivey	[greg.ivey@uwa.edu.au]
Tracie Barber	[t.barber@unsw.edu.au]
Paul Brandner	[p.brandner@utas.edu.au]
Bianca Capra	[b.capra@qut.edu.au]
Emilie Sauret	[emilie.sauret@qut.edu.au]

Automatic and co-opted council members

Scott Draper	[scott.draper@uwa.edu.au]	20AFMC LOC
Richard Kelso	[richard.kelso@adelaide.edu.au]	21AFMC LOC
Roger Nokes	[roger.nokes@canterbury.ac.nz]	NZ Rep. (South)
John Cater	[j.cater@auckland.ac.nz]	NZ Rep. (North)
Jim Denier	[jim.denier@mq.edu.au]	Applied Maths Rep.
Evatt Hawkes	[evatt.hawkes@unsw.edu.au]	Combustion Inst. Rep.
Wenxian Lin	[wenxian.lin@jcu.edu.au]	Student Prizes

Subcommittees

<i>Student Prizes:</i>	Wenxian Lin (Chair), Tony Lucey, Richard Kelso
<i>ARC College of Experts:</i>	Steve Armfield (Chair), Tony Lucey, Ivan Marusic
<i>Fellowships:</i>	Hugh Blackburn (Chair), Ivan Marusic, Lex Smits, Ross Griffiths
<i>Future AFMCs:</i>	Hugh Blackburn (Chair), Richard Manasseh, Roger Nokes, Julio Soria
<i>Outreach:</i>	Richard Manasseh (Chair), Richard Kelso, Jim Denier
<i>ARC Centres of Excellence:</i>	Ivan Marusic (Chair), Steve Armfield, Jim Denier
<i>Regional Branches:</i>	Bianca Capra (Chair), John Cater, Tony Lucey
<i>Women in Fluids:</i>	Bianca Capra, Nicole Jones, Daniel Edgington-Mitchell

22AFMC in 2020

Two excellent submissions were received in response to the call to host the 22AFMC; these came from Brisbane (UQ and QUT) and Sydney (USyd with UNSW and Macquarie). In addition to the documentary bids that were of a very high professional standard, each team made an (online) live presentation to the AFMS Council followed by a Q&A session. Through its subsequent deliberations, the Council arrived at the position that both bids

demonstrated the capability and genuinely enthusiastic commitment to host the conference and therefore a secret ballot of Council members was held.

The winning bid was from Brisbane. The Brisbane team are congratulated on their success while the Sydney team are encouraged to bid for the 23AFMC given the quality of their submission.

AFMS Website

The AFMS website is gradually being developed with a number of new tabs and entries being introduced over the last year. This process is ongoing and serves to evolve the site into a central source of information and announcements for AFMS members; for example, all of the 20AFMC papers are now posted. Please take a look at the website at: <http://www.afms.org.au>

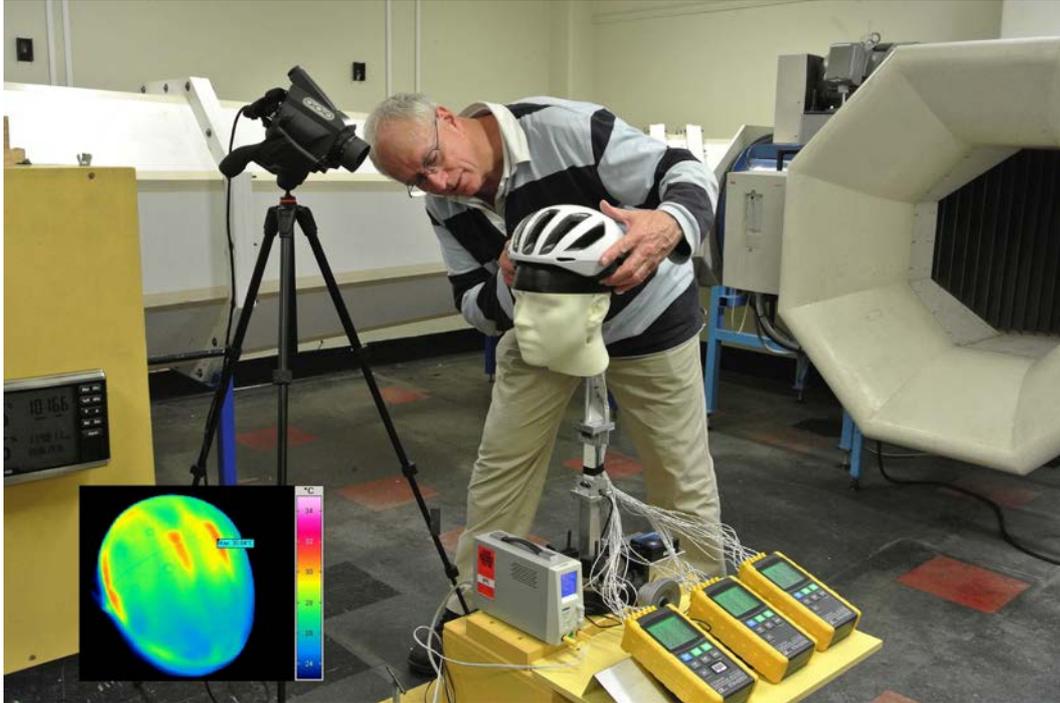
IN THE NEWS

The AFMS newsletter is introducing a new 'in the news' section to communicate fluid-mechanics 'stories' that have an appeal to, and can be understood by, the broader community. What we will report upon in this section is effectively a form of outreach activity conducted by our members and an important part of the Society's mission. If you have any stories suitable for this section of the newsletter we would be happy to hear from you (send to t.lucey@curtin.edu.au). As an example of the type of item sought, please read on!

AFMS Council member, Richard Kelso (University of Adelaide) featured in the recently published list of 'Australia's Most Innovative Engineers', developed by the professional body Engineers Australia, and was one of three listed in the Research & Academia category. Richard won this accolade for his work in the field of cycling aerodynamics and low-drag bicycle helmet design.

The award recognised Richard's work with Cycling Australia and Swiss-based Scott Sports SA to develop two helmets: a 'Pursuit' helmet for Australia's Rio Olympic track cycling team and a low-drag, well-ventilated helmet for competitive road and triathlon cycling. The projects used a range of techniques from the modeling of convective heat transfer and pressure drop within the helmet, to wind-tunnel measurements using a full-size, anatomically-accurate mannequin, mounted on a pursuit bicycle. Flow visualization, velocity and drag measurements were used to gain insights into helmet-body aerodynamics in order to optimise the flow and minimise the drag of the helmet and cyclist. Cooling studies used a purpose-built, internally-heated headform, incorporating 36 thermocouple sensors and a thermal camera. Detailed temperature distributions enabled identification of hot spots beneath the helmets, informing the optimisation process.

Both projects were completed in 2016 and produced helmets with lower drag than any of their competitors. The road/triathlon helmet, known as the Scott Cadence, has been used with great success by the Orica-Scott professional team and leading triathletes. The pursuit helmet, known as a Kask Mistral, was worn by two gold, two silver and one bronze medallist in the recent Track Cycling World Championships, and by the Mens' Team Pursuit silver medallists in the Rio 2016 Olympics. Both helmets are marketed worldwide.



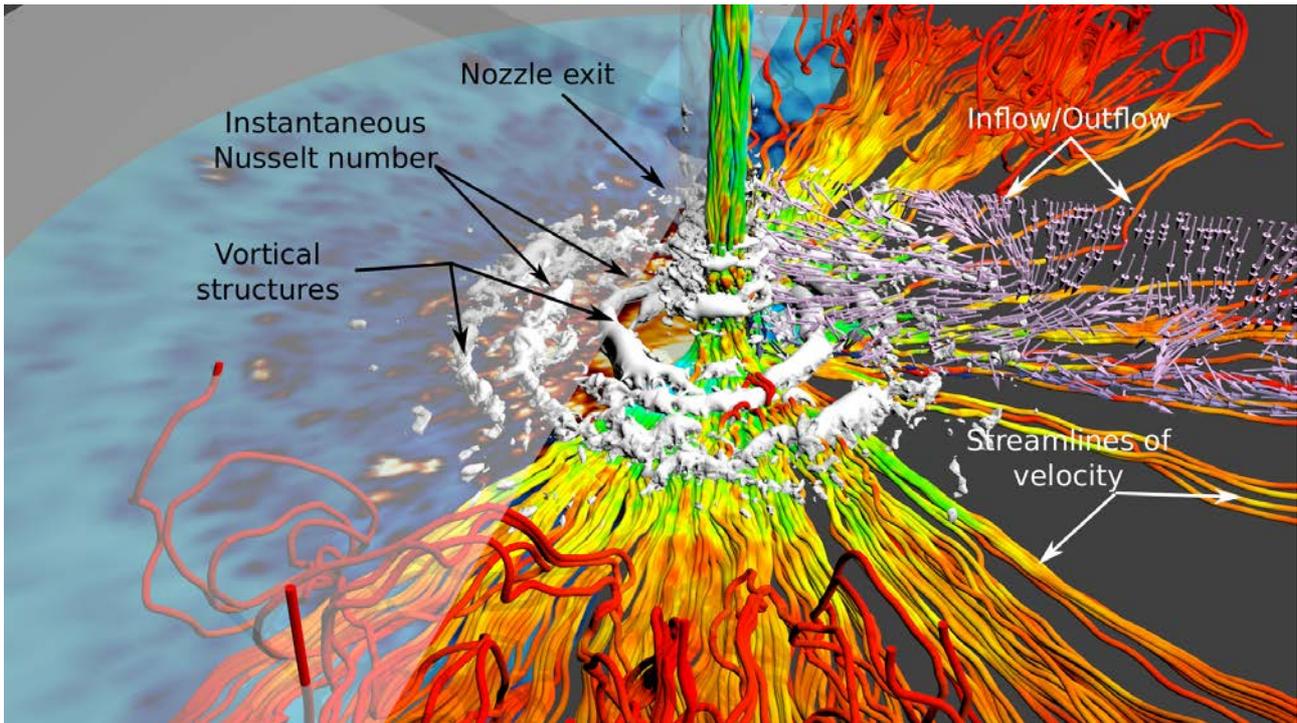
Kelso fits a Cadence helmet to the heated head form. Inset: typical thermal image showing the temperature distribution on the head inside a helmet.

ENDPIECE

If you would like to contribute an item for inclusion in a following newsletter, then please contact the secretary of the AFMS at t.lucey@curtin.edu.au

The Society's website can be found at: <http://www.afms.org.au>

This newsletter's fluid-mechanics image – see following page - is provided by Thangam Natarajan, PhD student at Curtin University. **More submissions are requested for future editions of the newsletter and for the AFMS gallery.**



The complex flow phenomenology of jet impingement: Jet impingement is often used for efficient heat transfer in industrial settings. The impinging jet produces an array of complex features upon exit from a nozzle. The image shows the result of a Large-eddy Simulation (LES) where the issuing jet fluid interacts with the quiescent medium to produce large scale vortical structures (shown as iso-surfaces of pressure) that travel axially downward, impinge on the surface, and convect radially outward removing heat from the surface (measured by Nusselt number). The flow into/away from the domain is shown as vectors on a plane and the streamlines of velocity illustrate the radial deceleration (red indicates low velocity). Figure adapted from: Natarajan, T., Jewkes, J. W., Lucey, A. D., Narayanaswamy, R., & Chung, Y. M. (2017). *International Journal of Heat and Fluid Flow* 65: 277-298.