Women in Mathematics Special Interest Group (WIMSIG)

2020 Annual Report to the Australian Mathematical Society

October 21, 2020

Contents

This report includes activities from November 2019 to October 2020.

1 Executive Committee

- Chair: Jessica Purcell, Monash University

- Incoming Chair: Catherine Greenhill, UNSW Sydney

- Treasurer: Valentina Wheeler, University of Wollongong

- Secretary: Jennifer Flegg, University of Melbourne

- Ordinary Member: Julia Collins, Edith Cowan University

- Ordinary Member: Sevvandi Kandanaarachchi, RMIT

- Student Member: Rose Crocker, University of Adelaide

2 Events

2.1 Women in Maths Gatherings

The COVID-19 pandemic has reduced the number of gatherings that have been held, with several scheduled May 12 events being cancelled/postponed. We are not aware of any Women in Maths Gatherings that have been held in person or online. ACEMS generously provided funding for May 12 events in 2020; these will need to postponed to 2021.

2.2 Embedded Events

It has become an established component of the national AustMS and ANZIAM conferences to hold a Women in Mathematics dinner or lunch, respectively. Members of the WIMSIG Executive Committee take lead roles in the organisation and running of these events. The following events have been held in the last year:

- December 2019: Women in Mathematics Dinner at 63rd AustMS Annual Meeting, Monash University (Funded in part by the ARC Georgina Sweet Laureate Fellowship of Kate Smith-Miles, and ACEMS).

- February 2020: Women in Mathematics Lunch at ANZIAM Annual Conference, Hunter Valley, Australia (Funded in part by the ARC Georgina Sweet Laureate Fellowship of Kate Smith-Miles).

Planning is under way for the following Women in Maths events, to be held in the next few months:

- December 2020: Women in Mathematics Event at 64th Annual Meeting which will be an online conference, hosted by the University of New England.

- February 2021: Women in Mathematics Event at ANZIAM Annual Conference which will be an online conference, hosted by Monash University.

We express our gratitude to Professor Kate Smith-Miles for the support she has given from her ARC Georgina Sweet Laureate Fellowship. Professor George Willis has generously agreed to use funds from his Laureate Fellowship to help support these events in the future.

2.3   Endorsed Events

Please see the website (`https://austms.org.au/special-interest-groups/wimsig/wimsig-supported-events/`) for events organised by others that were endorsed and advertised by WIMSIG. The website also contains a WIMSIG advice sheet for organisers of such events.

3   Advocacy

3.1   Presentations

The WIMSIG Chair was invited to give presentations at the following events, to discuss our activities to support women in mathematics, and why that support is needed:

- AustMS meetings, special session on Equity, Diversity, and Inclusion, December 2019.

- Statistical Society of Australia, Victoria Branch Event, 10 December 2019.

- Australian Council of Heads of Mathematical Sciences (ACHMS), 18 February 2020. WIMSIG also submitted a report on our activities to ACHMS at that time.

Additionally, the WIMSIG Chair was invited to give a short motivational welcoming talk to the European Girls Mathematics Olympiad team, at the team announcement event organised by the Australian Mathematics Trust, 8 February 2020.

3.2   Reports

As WIMSIG Chair, Jessica Purcell was invited to contribute to a report on the effect of the COVID-19 pandemic on women in STEM fields. This was

a rapid research information brief prepared for the Minister for Industry, Science and Technology in Australia. It is available here: `https://www.science.org.au/covid19/women-stem-workforce`

This report has led to additional related discussion. For example, Purcell has been invited to participate in an ACEMS panel on the impact of COVID-19 on early career researchers, to be held 5 November 2020.

3.3 Women in Maths video messages for May 12

To celebrate the life and birthday of Maryam Mirzakhani, ACEMS coordinated the production of 74 video messages from women in mathematics and statistics. WIMSIG helped to spread the word through our mailing list and Twitter account. The videos can be viewed on YouTube: `https://www.youtube.com/playlist?list=PLBxgDdQG5yHK8NAlHzRiOoTxHP4A4EaLt`

3.4 Women of Mathematics Throughout Australia Poster Exhibit

In early 2019, WIMSIG was asked to propose a list of women mathematicians across Australia for the creation of a poster exhibit, similar to the European exhibit: `http://womeninmath.net/`. Care was taken to ensure representation across academic levels, research discipline, Group of Eight universities, and ethnic background. The 15 women were interviewed in August 2019. The Australian Women of Mathematics exhibit is now available here: `https://sites.google.com/view/pierre-portal/australian-women-of-mathematics`.

The project is being led by Associate Professor Pierre Portal, ANU Mathematical Sciences Institute. Due to COVID-19, the launch date of the poster exhibit is expected to be delayed until the start of first Semester 2021.

3.5 Connections with Other Organisations

The Chair of WIMSIG has been invited to sit on the following committees and boards:

- MATRIX Advisory Board

- National Committee for Mathematical Sciences,
  of the Australian Academy of Science

Through our participation on these boards, WIMSIG is able to suggest concrete steps to make Australian mathematics more equitable and diverse.

3.6 Newsletter

The WIMSIG Newsletter is published every month on the WIMSIG website: `https://austms.org.au/special-interest-groups/wimsig/wimsig-news/`.

News, events, job opportunities and media links of interest to the WIMSIG community are included. We love to spread the word about our members doing interesting research, teaching or outreach work. We inform our members about the issues surrounding career progression of professional mathematicians. We highlight events and opportunities in the hope of boosting the participation rates of women in events and hiring short lists. The monthly newsletter is an important project of WIMSIG, and supports all of WIMSIGs other projects. A text version of the newsletter is also sent out to the WIMSIG mailing list.

The submission deadline is the 27th of each month, with publication of the newsletter occurring on the first day of each month, or soon after. Please send through your news, job ads, events and media articles to the WIMSIG Newsletter Editor Joanne Hall at `WIMSIG-news@women.austms.org.au`.

3.7 Website

The WIMSIG website continues to be maintained by WIMSIG Webmaster Amy Glen. The website contains newsletters, event advertisements, job advertisements, a funding directory, resources on gender equity in STEM, Q&A with female mathematicians, information about the Hanna Neumann Lecturers and links to the Cheryl E. Praeger, Anne Penfold Street and Maryam Mirzakhani Awards. It can be found here: `https://austms.org.au/special-interest-groups/wimsig/`

4 Projects

4.1 WIMSIG Awards

In 2019, WIMSIG began administering the AustMS-WIMSIG Maryam Mirzakhani award, which is designed to support international female students pursuing a postgraduate degree in mathematics in Australia. The second round of this award closed on 1 April 2020. WIMSIG continues to administer the AustMS-WIMSIG Cheryl E. Praeger Travel Awards, to support Australian female mathematicians to attend conferences or visit collaborators, and the AustMS-WIMSIG Anne Penfold Street Awards, which provide additional financial support for Australian mathematicians of any gender with caring responsibilities.

Since the 2019 Annual Report, there have been two rounds of AustMS-WIMSIG Awards, with closing dates of 1 April 2020 for Round 12 and 1 October 2020 for Round 13. We include in Appendix A the reports received

so far for Round 11 (closing 1 October 2019), which was still being finalised at the time of the previous Annual Report and Round 12.

Due to the impact of COVID-19 on international and national travel, there were no applications for Round 13. Also most of the successful applicants for Round 12 were not able to undertake the travel. AustMS has agreed to allow them to access their funds for their planned travel at a later date when possible.

In Round 12 we received three applications for the Cheryl E. Praeger Travel Awards, three applications for the Anne Penfold Street Awards and six applications for the AustMS WIMSIG Maryam Mirzakhani Award.

The Selection Committees consisted of:

- Natalie Thamwattana, Marcy Robertson, Florica Cirstea – R11.

- Marcy Robertson, Florica Cirstea, Xiaoping Lu – R12.

- Florica Cirstea, Xiaoping Lu, Sara Herke – R13.

For Rounds 11–12, there were seven (R11:4 + R12:3) Praeger Travel and four (R11:1 + R12:3) Street Travel awardees:

AustMS WIMSIG Cheryl E. Praeger Travel Award:

R11 Alessandra Vittorini Orgeas Research visit Bologna Italy and Summer Physics School in Bad Honnef;

R11 Geetika Verma - ANZIAM 2020;

R11 Gobert Lee - Department of ESIR/Laboratoire Traitement du Signal et de I'Image (LTSI) of University of Rennes 1, Rennes, France and IEEE BIBE 2019;

R11 Pantea Pooladvand Research visit to Utrecht University, Netherlands;

R12 Ellena Moskovsky - trip to the 2020 School and Workshop in Topological Recursion and a research visit at the Institut de physique théorique (IPhT, Paris-Saclay);

R12 Eloise Tredenick - trip to the Forum "Math-for-Industry" 2019 - Mathematics for the Primary Industries and the Environment, Massey University, Albany Campus, New Zealand;

R12 Jessica Crawshaw - trip to the 2020 ICTAM congress in Milan, Italy and the joint ESMTB-SMB conference in Heidelberg, Germany;

AustMS WIMSIG Anne Penfold Street Award:

R11 Geetika Verma - ANZIAM2020;

R12 Anthony Licata - childcare costs while visiting the Max Planck Insitute in Bonn, Germany;

R12 WoMBat 2020 workshop (applicant Vera Roshchina);

R12 Zsuzsanna Dancso - Mathematical Sciences Research Institute (MSRI) semester program on Higher Categories and Categorification, in Berkeley;

AustMS WIMSIG Maryam Mirzakhani Award:

R2 We received six applications for the AustMS WIMSIG Maryam Mirzakhani Award Round 2.

The committee recommended that the Mirzakhani award be given to BUI Thi Hoa. BUI Thi Hoa is a full time international PhD student in mathematics, originally from Vietnam. She commenced her PhD program in the Centre for Informatics and Applied Optimisation at Federation University Australia on 9 December 2016, with her candidature confirmed on 20 December 2017. Hoa holds an Australian Government Research Training Program (RTP) Stipend. She obtained her undergraduate degree in mathematics from Ho Chi Minh City University of Education, where she specialized in optimisation, and produced a research thesis, which brought her several awards.

Hoa's PhD project is in the area of variational analysis and optimisation and targets development of tools for the analysis of stability of solutions of optimisation problems and convergence analysis of computational algorithms. Up to now, she has published 7 journal papers, 3 of which in the highly ranked Journal of Optimization Theory and Applications. She has become a valuable member of the Australian optimisation community.

4.2   WIMSIG Twitter Account

In 2019, WIMSIG established a Twitter account with handle @wimsigAU. We continue to promote women in mathematics events and the successes of women mathematicians. In the last 12 months, WIMSIG made 605 tweets, is following 108 accounts and is followed by 302 accounts. The average number of "impressions" per month in 2020 is 9896, with the biggest being 23500 in February.

4.3   WIMSIG Conference 2021

Following the success of the first WIMSIG conference in September 2017, we are now in the organisation stage of the second WIMSIG conference, which will be held in October 2021 at Monash University. The conference

was planned to take place in 2020, but the organising committee decided to postpone to 2021 given the travel restrictions in place for 2020. Professor Jessica Purcell is the Conference Director. The WIMSIG 2021 conference organising committee consists of:

- Jessica Purcell (Monash University)

- Jennifer Flegg (University of Melbourne)

- Sevvandi Kandanaarachchi (RMIT)

- Jessica Kasza (Monash University, and President, Statistical Society of Australia (SSA))

- Amy Glen (Murdoch University)

- Christina Kazantzidou (QUT)

- Lynn Batten (Deakin, emeritus)

4.4   WIMSIG Mentoring Scheme

The WIMSIG EC has moved forward with its plans to start a mentoring scheme for WIMSIG members, following the strong support for this indicated by the survey conducted in 2017. The mentoring scheme was launched in October 2019, details can be found here: `https://austms.org.au/special-interest-groups/wimsig/wimsig-pilot-mentoring-program-2020/`. Members of the WIMSIG mentoring committee are:

- Deborah Cromer (UNSW Sydney)

- Julia Collins (ECU)

- Barbara Maenhaut (UQ)

- Bronwyn Hajek (UniSA)

Below we summarise the mentor-mentee pairings made for the pilot program in 2020:

1. There were 25 pairings made.

2. Initial registration of interest was from a pool of 25 mentees and 19 mentors.

3. We recruited an additional 5 mentors from known contacts to match up with requests for location/area of mathematics from mentees. It would not have been possible to accommodate requests without this additional step. Of these, 4 were recruited during initial pairings and one was recruited due to a rejected pairing.

4. Of the initial pairings there were three that were rejected. Reasons were because (i) Mentor no longer had capacity (ii) Pairing relationship was too close in career stage (mentee and mentor completed undergraduate together - this was not something known by the committee) and (iii) Mentor did not want to work with someone in a different location. All Mentees were subsequently paired with different Mentors (1 newly recruited).

5. In two cases a mentor was paired with two separate mentees.

6. One potential mentor was not utilised due to there being no appropriate mentee with which to pair this mentor. This was due to the location of mentor, who was based in NZ. In addition, we had one mentoring pairing end in June after the mentor decided that they needed to prioritise other things in their schedule.

5 Membership

The WIMSIG membership list and mailing list are maintained by the WIMSIG Secretary, Jennifer Flegg. In 2020, WIMSIG numbers ("Friends" and "Members" of WIMSIG) had grown to 597, of whom 357 are members of AustMS ("Members" of WIMSIG). This is compared to 320 Members in 2019, with 524 Friends/Members. The trajectory of membership is shown in Figure 1.

6 Elections

We are currently seeking several new members of the Executive Committee (Student Member, Secretary, Treasurer and 2 × Ordinary Members). Nominations will close on November 30 2020 and elections will be held soon after, as required. Associate Professor Vanessa Venturi (UNSW Sydney) is acting as returning officer.

7 Funds

In 2019, WIMSIG submitted a funding proposal for 2019–2021, and was approved funding for

- $3,200 for operational purposes, including travel money to attend events for advocacy (the session 2019–2020)

- $20,000 for the Cheryl E. Praeger Travel Awards (FY 2020–2021)

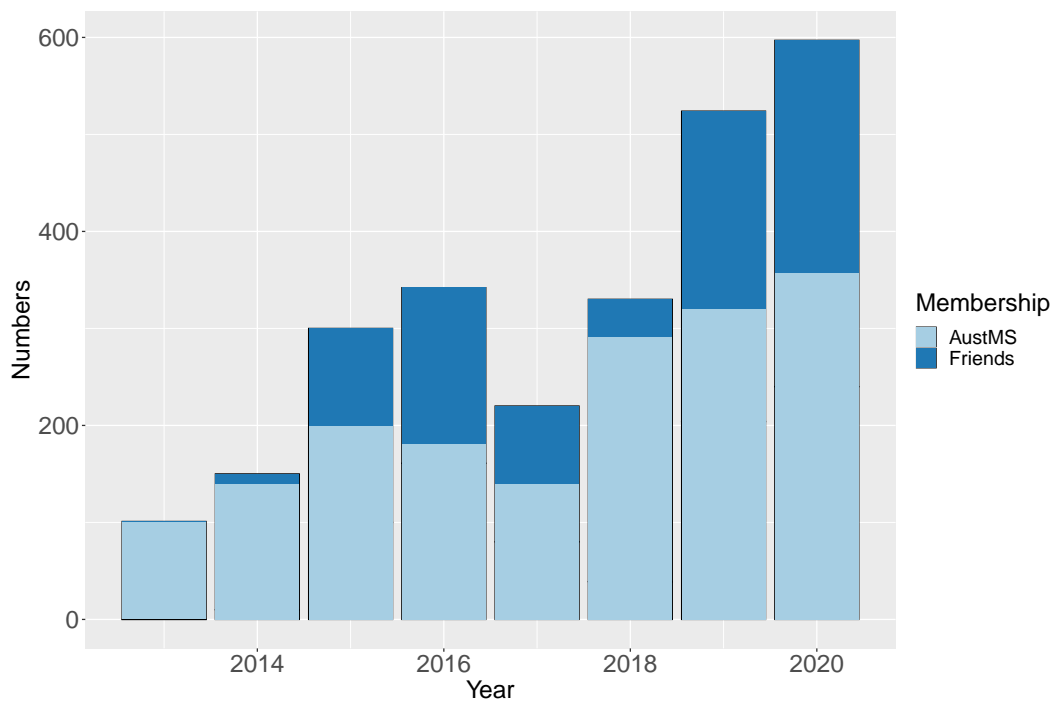- $3,000 for the Anne Penfold Street Awards (FY 2020–2021).

Figure 1: Trend of WIMSIG membership numbers, by AustMS membership and "Friends of WIMSIG".

A summary of expenditures, and WIMSIG's future funding request, have been prepared as a separate document by the WIMSIG Treasurer Valentina Wheeler.

Jennifer Flegg
Secretary
Women in Mathematics Special Interest Group
Australian Mathematical Society
2 November 2020

A   Travel Award Reports, Rounds 11–12

On the following pages we present the reports by recipients of the AustMS-WIMSIG Cheryl E. Praeger Travel Award and the AustMS-WIMSIG Anne Penfold Street Award in R11 and R12. Quite a few of the award recipients could not travel so the reports have yet to be received.

R11 Gobert Lee (P)

Gobert Lee (Flinders University, Adelaide) was awarded a Cheryl E. Praeger Award (2019) for a research visit to the University of Rennes, and the Anti-Cancer Centre Eugene Marquis, Rennes, France and to attend the 19th IEEE International Conference on BioInformatics and BioEngineering (BIBE'2019) in Athens in October 2019. In October 2019, I visited the Laboratoire Traitement du Signal et de I'Image (LTSI), University of Rennes, and the Anti-Cancer Centre Eugene Marquis, Rennes, France. The visit aims to foster research collaboration and resulted in fruitful discussions in auto-contouring of tumor for brain cancer radiation treatment (RT-) planning. Future projects will focused on machine learning based auto-contouring, applying mathematics and statistical theories in clinical area. Auto-contouring is a significant step in optimizing radiation dose delivered to the tumor whilst minimizing that to the surrounding healthy brain tissues. In addition to the fruitful discussions, I was given an insightful site tour at the Anti-Cancer Centre Eugene Marquis. The site tour gave me an invaluable experience and opportunity in better understanding the workflow in the RT department. During the research visit, I also gave a seminar to the Biomedical Engineering students at the University of Rennes. One of the purposes of the seminar was to inspire and encourage more women students to pursue quantitative research in Biomedical Engineering.

I also attended the 19th annual conference of the IEEE International Conference on BioInformatics and BioEngineering (BIBE'2019) held in Athens, Greece. The conference is a leading conference in bringing two complementary disciplines, Bioinformatics and Bioengineering, together in advancing research and development in complex medical and biological systems. I presented two oral papers: (1) " Prior guided segmentation and nuclei feature based abnormality detection in cervical cells" and (2) "Organs-at-risk contouring on head CT for RT planning using 3D Slicer - a preliminary study". The latter paper was the first joint publication with University of Rennes and Anti-Cancer Centre Eugene Marquis on brain tumor radiotherapy - marking the beginning of a collaboration relationship. The two peer-reviewed conference papers are published in the Proceedings of BIBE 2019.

I would like to thank the support of the prestigious AustMS WIMSIG Cheryl E. Praeger Travel Award which makes my research visit to the University of Rennes and the Anti-Cancer Centre Eugene Marquis, Rennes

France possible. The Award also makes possible for me to attend and present two research papers at the IEEE BIBE'19 conference.

R12 Zsuzsanna Dancso (S)

Travel Summary. In January-February 2020 I completed a two-month research trip, with the primary goal to attend as a funded Research Member the first five weeks (20 January - 24 February) of the Mathematical Sciences Research Institute (MSRI) semester program on Higher Categories and Categorification, in Berkeley. Before the program I spent ten days (6-15 January) visiting the Alfred Renyi Institute of Mathematics in Budapest. Talks. As part of the trip I gave a seminar talk on January 27, 2020, at the University of California, Davis, on Flow Lattices and Koszul Algebras. An unexpectedly large number of PhD students attended the talk and lunch, and I had substantial conversations with a few of them. It is currently a priority to me to build relationships with the emerging researchers in my area, as I hope to be in a position to recruit a post-doctoral fellow in the next couple of years. I have also had success building collaborations through the International Visitor Program at the University of Sydney, which has now greatly expanded thanks to the Sydney Mathematical Research Institute. During my stay in Berkeley I also gave an introductory talk on my research interests at the MSRI on February 22, 2020, which lead to inspiring discussions with Muriel Livernet, whom I only met on this trip. In addition, I lead two outreach workshops on Planar Graphs and Cut-Flow Duality on February 13 and 20, at the Berkeley Math Circles, a highly acclaimed enrichment program for high school students. Research and Professional Benefits. It has always been important an important career goal of mine to maintain ties with the Renyi Institute and the Hungarian mathematical community, where my mathematical career began. Over the past few years I have built relationships with a number of researchers there, and established a "tradition" of visiting the institute approximately once a year. On this visit I discussed possible research directions with Katalin Vesztergombi and Balazs Szegedy. The program at MSRI included two workshops during my stay: "Connections for Women" and the "Introductory Workshop". This had a double benefit as it introduced me to a new research area - higher categories and operads - while also providing the opportunity to work with an established collaborator, Dr Marcy Robertson of the University of Melbourne. During this time we submitted two joint ARC Discovery grant applications and made progress on a joint paper. Being co-located was especially beneficial to the paper as we worked out some subtle technical issues that would have been time consuming over email or video calls. I also had the chance to refresh discussions with a number of other researchers at the MSRI, including my former post-doc mentors Monica Vazirani and Scott Morrison, as well as David Jordan and Paul Wedrich. The most promising outcome of

these discussions is a possible project at the interface of quantum topology and category theory with Scott Morrison. Overall, this travel was a great research boost, and even more valuable in light of the current COVID-19 crisis, as I am unlikely to be able to travel internationally for the foreseeable future.

R12 Eloise Tredenick (P)

I am privileged to be awarded the AustMS WIMSIG Cheryl E. Praeger Travel Award for attending the Forum "Math-for-Industry" 2019 - Mathematics for the Primary Industries and the Environment, Albany Campus, Massey University, New Zealand was held 18 th to 21 st November. https://apcmfi.org/app/webroot/fmfi2019/ For four days, there were presentations on Industrial and Applied Mathematics, a networking event with Industry partners who regularly contribute to projects to Mathematics in Industry Study Groups (MISGs), poster presentations from research students and an excursion around the beautiful Auckland (Waitemata) harbour. The opportunity to network with industry partners and academics was important as industrial applications directly relate to my research. I was interested in networking with Dr Steven Psaltis, Dr Elliot Carr, Prof. Graeme Hocking, Dr Brendan Florio, Assoc. Prof. Winston Sweatman and Prof. Mark McGuinness, who work on transport in porous media, which has been the basis of my research. On the 21 st , I presented the talk: Agrochemical droplet evaporation and diffusion through plant cuticles: surfactant effects. To be an invited speaker at this conference as an early career researcher (ECR) was a rare and prestigious honour and there were few other ECRs in attendance. My presentation was very well received. An interesting discussion point was that my research originated as an MISG project, which re-enforced the importance and outcomes of MISG meetings. Highlights of the forum were talks on electrical power production including geothermal and fusion, especially a talk entitled: Alternative Energies: Is it Time for fusion?, by Nick Long, and three presentations on the projects from MISGs from Dr Brendan Florio, Prof. Graeme Hocking and Prof. Mark McGuinness. The forum was attended by around 60 people with 25 invited speakers and 17 poster presentations by research students. The forum attracted delegates from all over the world including Australia, New Zealand, Japan, South Korea, China, Malaysia and Thailand. Prior to the forum, on 14 th November, I also utilised the travel opportunity and visited the industrial supervisor of my PhD, Dr Alison Forster, Plant Protection Chemistry New Zealand (PPCNZ), for a day of research and collaboration at Scion Laboratories, Rotorua. I would like to thank AustMS and WIMSIG for the support on this very worthwhile trip to New Zealand.