

Women in Mathematics Special Interest Group (WIMSIG)

2021 Annual Report to the Australian Mathematical Society

November 4, 2021

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This report includes activities from November 2020 to October 2021.

1 Executive Committee

- Chair: Catherine Greenhill, UNSW Sydney
- Immediate Past Chair: Jessica Purcell, Monash University
- Treasurer: Valentina Wheeler, University of Wollongong
- Secretary: Serena Dipierro, University of Western Australia
- Ordinary Member: Julia Collins, Edith Cowan University
- Ordinary Member: Xiaoping Lu, University of Wollongong
- Student Member: Ellena Moskovsky, Monash University

2 Events

2.1 Women in Maths Gatherings

The COVID-19 pandemic has reduced the number of gatherings that have been held. ACEMS generously provided funding for May 12 events in 2020, which were postponed to 2021. In 2021, live events to celebrate International Women in Mathematics day (12 May) were held at Deakin University, RMIT, University of Melbourne, Western Sydney University, and the WA cluster of universities formed by University of Western Australia, Murdoch University, Curtin University and ECU. All these events were generously funded by ACEMS. The celebrations included speakers, panel discussions and a poster exhibition of Women in Mathematics, and were a wonderful opportunity for staff and students to celebrate inclusivity in mathematical sciences.

Our friends at ACEMS have hosted other relevant events, including an online panel discussion on “The Road Ahead for Women in STEM” and an in-person event in Brisbane at QUT, presenting a digital display of the exhibition “Remember Maryam Mirzakhani”.

On 1 October 2021, the **WIMSIG Conference** took place in a hybrid format. The talks were broadcast online via Zoom and we had local hubs in Adelaide, Brisbane, Hobart and Perth, where we could have in-person gatherings. More details are given in §4.3 below.

2.2 Embedded Events

It has become an established component of the national AustMS and ANZIAM conferences to hold a WIMSIG dinner or lunch, respectively. Members of

the WIMSIG Executive Committee take lead roles in the organisation and running of these events. Due to the COVID-19 pandemic, the 64th Annual AustMS Meeting (December 2020) and the ANZIAM Annual Conference (February 2021) were held online, successfully incorporating a virtual WIMSIG “dinner” and “lunch”, respectively.

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

- December 2021: WIMSIG Dinner at 65th Annual AustMS Meeting. This will be an online conference, hosted by the University of Newcastle.
- February 2022: WIMSIG event at ANZIAM Annual Conference. This will be an online conference, hosted by the University of Western Australia.

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 annual meeting, special session on Equity, Diversity, and Inclusion, December 2020.
- Australian Council of Heads of Mathematical Sciences (ACHMS), 16 February 2021. WIMSIG also submitted a report on our activities to ACHMS at that time.

3.2 Reports

At the request of the Chair of the National Committee for the Mathematical Sciences (NCMaths), WIMSIG Chair and Outgoing WIMSIG Chair, Catherine Greenhill and Jessica Purcell were asked to prepare a report on gender issues in the mathematical sciences, to feed into the midterm review of the NCMaths Decadal Plan. The report was prepared with input from other former WIMSIG Chairs and prominent Australian women mathematicians.

3.3 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
- Australian Council of Heads of Mathematical Sciences

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

3.4 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 WIMSIG's 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.

3.5 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. 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 2020 Annual Report, there have been three rounds of AustMS-WIMSIG Awards, with closing dates of 1 October 2020 for Round 13, 1 April 2021 for Round 14 and 1 October 2021 for Round 15. We include in Appendix A the reports received so far for Round 13 and Round 14 (closing 1 October 2020 and 1 April 2021).

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. The impact is still felt in 2021 where reduced number of application is received due to the extended lockdowns and inability to travel due to pandemic.

We expect things to improve in 2022.

In Round 14 we received three applications for the Cheryl E. Praeger Travel Awards, and no applications for the Anne Penfold Street Awards and fourteen applications for the AustMS WIMSIG Maryam Mirzakhani Award.

The Selection Committees consisted of:

- Florica Cirstea, Xiaoping Lu, Sara Herke – R13.
- Florica Cirstea, Sara Herke, Sevvandi Kandanaarachchi –R14
- Sara Herke, Sevvandi Kandanaarachchi, Melissa Humphries –R15

For Rounds 13–14, there were two successful (R14:2) Praeger Travel awardees: *AustMS WIMSIG Cheryl E. Praeger Travel Award*:

R14 Adriana Zanca - teaching and research visit to Queensland University of Technology (QUT), Brisbane;

R14 Nargiz Sultanova - SIAM Conference on Optimization (OP21) on July 20-23, 2021, online event;

AustMS WIMSIG Maryam Mirzakhani Award:

R3 We received fourteen applications for the AustMS WIMSIG Maryam Mirzakhani Award Round 3.

The committee recommended that the Mirzakhani award be given to Maud El-Hachem (Queensland University of Technology).

Maud came to her postgraduate studies in applied mathematics with a background in computer science. Her undergraduate training and Master's thesis involved the development of computational algorithms for approximating gradient operators using novel GPU approaches. Given Maud's background in computer science and numerical methods, her PhD program focuses on the analysis (formal asymptotics and numerical methods) to study partial differential equation models of invasion that are often used in mathematical biology.

Maud's research focuses on comparing classical models, such as the well-known Fisher-Kolmogorov model, with more recent approaches that re-cast these models as moving boundary problems. This work seeks to overcome a key limitation of the Fisher-Kolmogorov model which, when non-dimensionalised, leads to travelling wave solutions with a positive wave speed, $c > 2$. This means that standard analysis neglects slower travelling wave solutions with $c < 2$. These slow travelling wave solutions are routinely disregarded on the grounds of being non-physical owing to arguments that arise in the phase plane. One of the limitations of traditional mathematical approaches to understand invasion is that the underlying biology is highly idealised, and a consequence is that travelling wave solutions with $c < 2$ are completely disregarded. Maud's work has carefully compared the classical application of the Fisher-Kolmogorov model with the more recent approach of studying the same partial differential equation reformulated with a moving boundary. This reformulated problem, that Maud has called the Fisher-Stefan model, allows us to study travelling wave solutions with arbitrary speed. This includes travelling wave solutions with $c < 2$, and even travelling wave solutions with $c < 0$, which Maud has called a receding travelling wave. Maud's work has been published in the *Bulletin of Mathematical Biology*, *Physica D: Nonlinear Phenomena* and *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*.

4.2 WIMSIG Twitter Account

In 2020, 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 77 tweets, is following 111 accounts and is followed by 417 accounts. The average number of "impressions" per month in 2021 so far is 13446 with the biggest being 21800 in March 2021.

4.3 WIMSIG Conference 2021

Following the success of the first WIMSIG conference in September 2017, we have organised the second WIMSIG conference, which was held on 1 October 2021 and was hosted by 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. Due to the COVID-19 pandemic, we had to move the plenary talks online, but we managed to have local hubs in Adelaide, Brisbane, Hobart and Perth, where in person gatherings were possible.

Professor Jessica Purcell was the Conference Director. The WIMSIG 2021 conference organising committee consisted of:

- Jessica Purcell (Monash University)
- Jennifer Flegg (University of Melbourne)
- Amy Glen (Murdoch University)
- Joanne Hall (RMIT)
- Sevvandi Kandanaarachchi (RMIT)
- Jessica Kasza (Monash University, and President, Statistical Society of Australia (SSA))
- Christina Kazantzidou (QUT)
- Lynn Batten (Deakin, emeritus)

Participants enjoyed plenary talks from Hamideh Anjomshoa (Melbourne), Shelly Harvey (Rice), Kristian Lum (Twitter) and Asha Rao (RMIT), as well as a panel discussion held at QUT. Various local activities were held at each hub.

According to the registration data, we had 201 participants (53 online, 41 Monash University, 10 Macquarie University, 12 University of Tasmania, 49 The University of Adelaide, 25 Queensland University of Technology, 11 University of Western Australia).

4.4 WIMSIG Mentoring Scheme

After a successful pilot of the WIMSIG Mentoring Scheme in 2019/2020, the 2021 WIMSIG Mentoring scheme will run from July 2021 - February 2022. Details of the scheme can be found here: <https://austms.org.au/special-interest-groups/wimsig/wimsig-mentoring-program/>.

Members of the WIMSIG mentoring committee are:

- Julia Collins (ECU)

- Bronwyn Hajek (UniSA)
- Barbara Maenhaut (UQ)
- Katherine Seaton (La Trobe)

Below we summarise the mentor-mentee pairings made for the mentoring program in 2021:

- There were 8 pairings made.
- Initial registration of interest was from a pool of 8 mentees and 7mentors.
- In one case a mentor was paired with two separate mentees.

5 Membership

The WIMSIG membership list and mailing list are maintained by the WIMSIG Secretary, Serena Dipierro. In 2021, WIMSIG numbers (“Friends” and “Members” of WIMSIG) were 562, of whom 302 are members of AustMS (“Members” of WIMSIG). This is compared to 357 Members in 2020, with 597 Friends/Members.

6 Elections

We are currently seeking two new members of the Executive Committee: Student Member (1 year term) and Incoming Chair (4 year term: one year as Incoming Chair, two as Chair, one as outgoing Chair).

Nominations will close on 30 November 2021 and elections will be held soon after, as required. Dr Emma Carberry (University of Sydney) is acting as returning officer.

7 Funds

In 2020, WIMSIG submitted a funding proposal for 2020–2022, and was approved funding for

- \$3,200 for operational purposes, including travel money to attend events for advocacy (the session 2020–2021)
- \$20,000 for the Cheryl E. Praeger Travel Awards (FY 2021–2022)
- \$3,000 for the Anne Penfold Street Awards (FY 2021–2022).

Women in Mathematics Special Interest Group

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

Serena Dipierro
Secretary
Women in Mathematics Special Interest Group
Australian Mathematical Society
November 4, 2021

A Travel Award Reports, Rounds 13–14

We have one report to present, from a recipient of the AustMS–WIMSIG Cheryl E. Praeger Travel Award in R14. Due to the pandemic, there were no applications for Round 13. The remaining award recipients could not undertake their travel yet, due to the pandemic. Reports from those recipients will be received later, when travel resumes.

R14 Nargiz Sultanova (P)

Nargiz Sultanova has received a Cheryl E. Praeger Travel Award to cover the registration fee for participating in the SIAM Conference on Optimization (OP21) on July 20-23, 2021 as an online event. Bellow is her report.

I would like to express my sincere gratitude for the support from AustMS WIMSIG and the Cheryl E. Praeger Travel Award which enabled me to attend SIAM Conference on Optimization (OP21) on July 20-23, 2021. SIAM Conference on Optimization is one of the most prominent international conferences in the field, it is held every three years and showcases the latest research on the theory, algorithms, software, and applications of optimisation. Due to the current Covid situation, the conference has been held virtually this year. Nevertheless, there were over 500 participants from around the world, including many leading experts in the field. It was a wonderful opportunity for me to present my research. The talk I gave on July 23 was part of a “Recent developments in Optimisation Algorithms” session and was entitled “Subgradient smoothing method for nonsmooth nonconvex optimisation”. In this talk I focused on the development of an algorithm using a smoothing technique that enables us to apply powerful smooth optimisation methods for solving general nonsmooth optimisation problems. There were many great presentations at the conference, and one of the advantages of the virtual format is that all the talks were recorded which gives bigger visibility and opportunities for the participants to watch many talks of interest even post-conference.
