Canadian Applied and Industrial Mathematics Society
Société canadienne de mathématiques appliquées et industrielles
Submissions

Submissions and ideas for publication are appreciated. They should be sent to the editor.

Email: secretary@caims.ca
Tel: (519) 888 4567 ext. 34468
Mail: Prof. Justin Wan
CAIMS•SCMAI Secretary
School of Computer Science
University of Waterloo
Waterloo, ON N2L 3G1

Advertising Rates

Inserts and non-advertising submissions (including letters to the editor) should be negotiated with the Secretary. Inquiries about deadlines, payment and acceptable formats should be directed to the Secretary.

Publication Information

The Canadian Applied and Industrial Mathematics Society / Société Canadienne de Mathématiques Appliquées et Industrielles (CAIMS•SCMAI) is a member society of the International Council for Industrial and Applied Mathematics (ICIAM). The newsletter is published at least once a year.

Editor: Justin Wan
Design and Production: Justin Wan
Photographs: from various contributors

Table of Contents

Reports from the Society
President’s Report ........................................2
Board of Directors ......................................4
Minutes from 2019 AGM ..............................8
Committee Members ...............................20
Report on CAIMS 2019 .............................21

Society Updates
CAIMS•SCMAI Awards ..............................23
2019 Election – Call for Nominations ........28
Math Biology Distinguished Lecture ........29

News from the Math Institutes
CRM ..........................................................31
PIMS .........................................................33

General News
SMB 2019: A Showcase for
Canadian Math Biology .......................38
Systems Modeling in the Pharmaceutical
Industry Problem Solving Workshop ....40
Blundon Seminar .................................42
Canadian Undergraduate
Math Conference ...............................43
Math Education Matters .....................46

Backcover
CAIMS•SCMAI 2020 Announcement
CAIMS President’s Message
By Thomas Hillen, CAIMS•SCMAI President

CAIMS-SCMAI has become a significant presence in industrial, scientific, and technological circles within and outside Canada. It serves the industrial and applied mathematics community in many ways.

The Annual Meeting, for example, is a real highlight of the year. It always reminds me of a family get-together; friends meet, new friendships are formed, and new members are welcome with open arms. The recent CAIMS-SCMAI Annual Meeting 2019 in Whistler BC was such an example. Expertly organized by Weiran Sun and Manfred Trummer (SFU) and their team, we were able to enjoy exciting talks of high quality in the stunning setting of the Whistler mountains. The next annual meeting 2020 will be a big one, as we join with the SIAM annual meeting 2020. It will be held July 6-10, 2020 in Toronto. Lia Bronsard (McMaster) agreed to join me as co-hosts for this meeting. Preparations are well underway as we just invited 16 plenary speakers from a large variety of fields!

The CAIMS-SCMAI awards is another highlight of the year! It is impressive to see the accomplishments of all of our nominees and it is a great honor when I finally meet the award winners at the Annual Meeting. In 2019 we awarded the CAIMS-SCMAI Research Prize (chaired by Hermann Eberl) to Pauline van den Driessche (U Vic), the CAIMS-Fields Industrial Prize (chaired by Sean Bohun) to Jianhong Wu (York), the CAIMS-PIMS Early Career Award (chaired by Jane Heffernan) to Bahman Gharesifard (Queens), the Arthur Beaumont Distinguished Service Award (chaired by Sharene Bungay) to Lucy Campbell (Carlton), and the Cecil Graham Doctoral Dissertation Award (chaired by Alexei Cheviakov) to Amir Maleki (UBC). Thank you for the tremendous work of the committee members, and congratulations to the prize winners! We are honored to have these exceptional scientists in our midsts. Please consider nominating somebody for the next round. Nominations are due by the middle of January.

As President of a large national society, I enter new land, and I am very grateful for the guidance, support, and examples set by the previous and current Executive team. I am ever grateful to the leadership of the two previous presidents Ray Spiteri (Saskatchewan) and Matt Davison (Western), and I am sure I can count on their advice as we move on. I learned more than I ever wanted to know about accounting and corporate law from our long-time Treasurer Lucy Campbell (Carlton). Thanks again, Lucy, for your tremendous work with the bylaws and compliance laws. It was, and still is, great fun to work with our Communications Officer Kathleen Wilkie to blow life into our new CAIMS websites, and I benefited greatly from the reliable stability of our secretary Justin Wan (Waterloo). Now I am looking forward to work with the new team: Rebecca Tyson (UBC-O) as President Elect, Justin Wan (Waterloo) continuing as Secretary, Kathleen Wilkie (Ryerson) continuing as Communications Officer, David Iron (Dalhousie) as new Treasurer, and Matt Davison (Western) as Past President.

With this team and the entire board, we have several activities in mind:
• MSI (Mathematics in Science and Industry)
  Unfortunately, the submissions to MSI are low - in fact too low. We did get excellent papers, but we are far away to meet the required 25 papers per year. CAIMS-SCMAI is committed to make the journal work, but at this time we need some creative thinking to get submissions up. If you have a good paper ready, please send it to us: https://caims.ca/mathematics_in_science_and_industry/

• CMS/CAIMS book series
  The new CMS/CAIMS book series with Springer has now started and we can begin to collect book proposals. CAIMS is represented through the two associate editors Nilima Nigam (SFU) and Frithjof Lutscher (Ottawa), and I like to thank them that they serve as editors. Please, consider to send your next book project to one of them.

• CAIMS-blog
  Rebecca Tyson and I discussed the idea to use our new fancy website to host a CAIMS blog. Applied Mathematics has so much to say about actual issues that are of interest to wider audiences. A CAIMS-blog gives members the opportunity to explain common concerns from a scientific point of view. It is a way that our community can participate in discussions of global relevance. Topics that we have in mind include, but are not limited to: climate change; the role of math in AI; is stat also math?; equity, diversity, and inclusion in applied math; graduate skills in applied math; challenges of Interdisciplinary work; math and cancer; math and bees; etc. If you like to give it a try, with a topic of your own choice, please contact me (thillen@ualberta.ca).

• CAIMS mentorship program
  Like many other societies, we plan to start a mentorship program. The purpose is to help young researchers in our field in their career paths. Young researchers are mentored by a senior colleague and are able to get advice and help related to career planning, negotiations of positions, publications strategies, tenure procedures, personal life such as child care, family-work balance, and very important, feedback on the first NSERC Discovery Grant application. If you are interested to participate in the mentorship program, either as mentor or as mentee, then please contact Rebecca Tyson (rebecca.tyson@ubc.ca).

As you see, the Society is alive and active. This could not be done without the involvement of every member of the Society, for example in award committees, organizational committees, editorships, and the CAIMS board. I thank you all for the positive vibe and the supportive spirit, and I am looking forward to see you all in Toronto in July 2020.

Thomas Hillen (CAIMS-SCMAI President)
Board of Directors

President

Thomas Hillen
Department of Mathematical and Statistical Sciences
University of Alberta
Edmonton, AB T6G 2G1
Phone: (780) 492 3396
Fax: (780) 492 6826
Email: president@caims.ca
Term ends: 2021

Past President

Matt Davison
Department of Applied Mathematics
University of Western Ontario
London, ON N6A 5B7
Phone: (519) 661 3621
Fax: (519) 661 3523
Email: past-president@caims.ca
Term ends: 2021

President-Elect

Rebecca Tyson
Department of Computer Science, Mathematics, Physics and Statistics
University of British Columbia (Okanagan)
Kelowna, BC V1V 1V7
Phone: (250) 807 8766
Fax: (250) 807 8001
Email: president-elect@caims.ca
Term ends: 2021
Communications Officer

Kathleen Wilkie  
Department of Mathematics  
Ryerson University  
Toronto, ON M5B 2K3  
Phone: (416) 979 5000 ext. 3560  
Email: communications-officer@caims.ca  
Term ends: 2021

Secretary

Justin Wan  
David R. Cheriton School of Computer Science  
University of Waterloo  
Waterloo, ON N2L 3G1  
Phone: (519) 888 4567 ext. 34468  
Email: secretary@caims.ca  
Term ends: 2020

Treasurer

David Iron  
Department of Mathematics and Statistics  
Dalhousie University  
Halifax, NS B3H 4R2  
Phone: (902) 494 2385  
Fax: (902) 494 5130  
Email: iron@mathstat.dal.ca  
Term ends: 2022
**Director**

Ben Adcock  
Department of Mathematics  
Simon Fraser University  
Burnaby, BC V5A 1S6  
Phone: (778) 782 4819  
Fax: (778) 782 4947  
Email: ben_adcock@sfu.ca  
Term ends: 2021

**Director**

Ion Bica  
Department of Mathematics and Statistics  
MacEwan University  
Edmonton, AB T5J 4S2  
Phone: (780) 633 3910  
Fax: (780) 497 5203  
Email: bical@macewan.ca  
Term ends: 2022

**Director**

Frithjof Lutscher  
Department of Mathematics and Statistics  
University of Ottawa  
Ottawa, ON K1N 6N5  
Phone: (613) 562 5800 ext 3510  
Email: flutscher@uottawa.ca  
Term ends: 2022
Director

Ray Spiteri
Department of Computer Science
University of Saskatchewan
Saskatoon, SK S7N 5C9
Phone: (306) 966 2909
Fax: (306) 966 4884
Email: spiteri@cs.usask.ca
Term ends: 2020

Director

Olga Trichtchenko
Department of Physics and Astronomy
University of Western Ontario
London, ON N6A 3K7
Phone: (519) 661 1211 ext 88697
Fax: (519) 661 2033
Email: otrichtc@uwo.ca
Term ends: 2020

Director

Brian Wetton
Department of Mathematics
University of British Columbia
Vancouver, BC V6T 1Z2
Phone: (604) 822 5784
Fax: (604) 822 6074
Email: wetton@math.ubc.ca
Term ends: 2021
Minutes of the CAIMS•SCMAI Annual General Meeting

Tuesday, June 11, 2019

Room Fitzsimmons, Whistler Convention Centre, Whistler

1. CAIMS•SCMAI President Matt Davison called the meeting to order at 12:20pm

2. Quorum was established

3. The meeting was constituted

4. Approval of the Minutes of the AGM of June 5, 2018:

The minutes were circulated electronically to members with the Notice of Meeting on May 21st, 2019 and are also available in the CAIMS Annual Fall Newsletter posted on the CAIMS•SCMAI website.

Motion (Brian Wetton/Mark Ressor): Approve the Minutes of the Annual General Meeting of June 5, 2018. Carried.

5. Business Arising from the Minutes:

None.

6. Annual report of:

a) President

Matt Davison presented the following report as CAIMS•SCMAI President.

Matt reported that our “core activities” are progressing well:

- We are set to have a successful 2019 meeting with more registrations than any of the last few years.
- Our 2020 meeting will be joint with SIAM and held in Toronto.
- We awarded prizes for all five of our 5 awards (Research, Early Career, DDA, Industrial, and Service!)
- Our membership numbers are roughly steady.
- We have supported a number of activities across the national community.

Matt reported some new developments:

- Our web redesign, already in process at last year’s AGM, has been completed and our new Communications Officer Kathleen Wilkie is working hard with this new website platform to explore its functionality).
- Our new journal has been launched.

Matt gave a brief update on CAIMS2019:

- 188 conference registrations as of yesterday.
- This surpasses previous max of 175 (2016) and 174 (2018).
• Exceptional organization by Weiran, Manfred, and their SFU team!

Matt gave an announcement of CAIMS2020:

• Joint with SIAM.
• Co-Lead Organizer our very own Thomas Hillen.
• Dates: July 6 – 10, 2020, Toronto.

CAIMS prize/award recipients of 2019:

• CAIMS-PIMS Early Career Award: Bahman Gharesifard (Queens)
• CAIMS Cecil Graham DDA: Amir Maleki (UBC)
• CAIMS Research Prize: Pauline van den Driesche (UVic)
• (Last year’s CAIMS Research Prize winner presents at this year’s conference): Leon Glass (McGill)
• CAIMS-Fields Industrial Math prize: Jianhong Wu (York)
• Arthur Beaumont Distinguished Service Award: Lucy Campbell (Carleton)

Matt gave a summary of community events supported:

• Fields Workshop on Mathematical Ecology.
• CAIMS Distinguished Lecture in Mathematical Biology (Simon Levin).
• SMB Meeting.
• Applications of Computer Algebra (ACA) 2019 – July 16-20 Montreal.
• I2MC industrial math competition (Hongmei Zhu, York).
• Canadian Undergraduate Mathematics Contest (Queens; July 16-20).
• Blundon Math Camp (Memorial).

Matt gave a short description of the “Math4Real”, a high school math outreach program, organized by Hongmei Zhu. Matt and Hongmei encouraged people to volunteer for the event.

Finally, Matt acknowledged the transitions. He will pass the torch to Thomas a President of CAIMS. He expressed thankfulness to the community for the chance to work with such a great community and with such great people! He looked forward to his term as Past-President.

Motion (Matt Davison/Lucy Campbell): Accept the President’s report. Carried.

b) President-Elect

Thomas Hillen presented the following report as CAIMS•SCMAI President-Elect.

Thomas presented a list of current CAIMS Committees:

• CAIMS Research Prize
• CAIMS-Fields Industrial Research Prize
• CAIMS-PIMS Early Career Award
• Arthur Beaumont Distinguished Service Award
• Cecil Graham Doctoral Dissertation Award
• Membership Committee
• MSI Editorial Board
• CMS/CAIMS book series

Thomas encouraged members to join the committees and thanked those who have served.

Thomas gave an update on the new journal, Mathematics in Science and Industry (MSI). There were 11 submissions, 2 accepted, 3 minor revisions, 3 in review, and 3 rejected. The plan is to publish the first issue in January 2020. We need 25 papers per year to be able to be indexed. Submission rate is way too low.

MSI Editorial Board

Editors in chief:
• Thomas Hillen (University of Alberta)
• Ray Spiteri (University of Saskatchewan)

Associate Editors:
• Lia Bronsard (McMaster University)
• Richard Craster (Imperial College, UK)
• David Earn (McMaster University)
• Jane Heffernan (York University)
• Nicholas Kevlahan (McMaster)
• Yong-Jung Kim (KAIST, Korea)
• Mark Lewis (University of Alberta)
• Kevin J. Painter (Heriot-Watt, UK)
• Vakhtang Putkaradze (Alberta)
• Katrin Rohlf (Ryerson University)
• John Stockie (Simon Fraser University)
• Jie Sun (Clarkson University, USA)
• Justin Wan (University of Waterloo)
• Michael Ward (UBC)
• Tony Ware (University of Calgary)

Thomas encouraged members to submit papers to MSI!

Thomas gave a report on the CMS/CAIMS book series:

• Springer is negotiating with CMS and CAIMS to start a Canadian Mathematical Book Series.
• This series will replace the existing CMS book series.
• Editorial board of 4 or more members (typically half from CMS and half from CAIMS) and board members are appointed for three years.
The goal is to have three book proposals per year (both societies together)

Royalties: CAIMS/CMS gets a total amount of $1000 for each book.

Author royalties: For monographs the authors get a standard honorarium (once!). For textbooks the authors get a standard percentage of the sales, typically 10%.

Thomas gave an update on the SIAM/CAIMS Annual Meeting 2020:

Joint meeting SIAM + CAIMS: July 6 - 10, 2020
Sheraton Centre in Toronto

- SIAM host: Lia Bronsard, McMaster
- CAIMS host: Thomas Hillen, Alberta

Organizational Committee
- Dean Bottino, Takeda
- Felix Otto, Max Planck
- Bob Kohn, NYU
- Pattie Bauman, Purdue
- Mary Pugh, Toronto
- Mariya Ptashnick, Heriot-Watt
- Benoit Perthame, Paris VI
- Ian Frigaard, British Columbia
- Kevin Zumbrun, Indiana
- Roummel Marcia, UC Merced
- Stan Osher, UCLA
- Hans De Sterck, Waterloo
- Tim Leung, Washington
- Diego Dominici, SUNY New Paltz

Thomas presented a Membership Report:

<table>
<thead>
<tr>
<th>Membership</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>43</td>
<td>56</td>
<td>45</td>
<td>47</td>
<td>50</td>
</tr>
<tr>
<td>Ind. via conference</td>
<td></td>
<td></td>
<td>43</td>
<td>39</td>
<td>54</td>
</tr>
<tr>
<td>Ind., retired</td>
<td>7</td>
<td>7</td>
<td>10</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Lifetime</td>
<td>92</td>
<td>95</td>
<td>100</td>
<td>102</td>
<td>104</td>
</tr>
<tr>
<td>Lifetime, retired</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>AIM (students)</td>
<td>18</td>
<td>38</td>
<td>86</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Institutional</td>
<td>10</td>
<td>14</td>
<td>11</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>179</strong></td>
<td><strong>219</strong></td>
<td><strong>304</strong></td>
<td><strong>224</strong></td>
<td><strong>237</strong></td>
</tr>
</tbody>
</table>

Institutional members are:

- Mathematics, U Manitoba
- Math and Stats, McGill
Motion (Thomas Hillen/Ray Spiteri): Accept the President-Elect’s report. Carried.

c) Past-President

Ray Spiteri presented the following report as CAIMS•SCMAI Past President.

The job of Past-President is definitely a good gig when you have a strong Board in place. Mercifully you eventually get used to life sans butler. Indeed during my time as various flavours of President, I have been exceptionally lucky to have a Board full of wonderful and extremely capable individuals. They are the ones who deserve the credit for making the Society what it is.

As Past-President, my official job is mainly to pass along my version of the so-called institutional knowledge of the Society to the current Board but mainly the President and President-Elect. It is not to give long-winded reports. I will do my best to stick to this mandate.

All kidding aside, I spent my time as Past-President mainly in a support role to help with some of the Society's initiatives that were on-going. These initiatives included helping out with the snazzy new CAIMS website and with the organization of this meeting (a huge shout out to the organizing committee who did a fabulous job -- all the way down to arranging for the fantastic weather) and planning for future meetings. I am particularly pleased to see that through a lot of effort, the seed planted in 2016 has grown into next year's meeting to be held in Toronto in conjunction with the 2020 SIAM Annual Meeting.

In reality, most of my Past-Presidential energy was spent on the launch of the new CAIMS journal, "Mathematics in Science and Industry". Personally I have felt for some time that it is important for Canada to have its own high-quality journal in applied and industrial mathematics to reflect our national strengths in these areas.

In this day and age, we share the reality of a proliferation of academic journals and papers. Given this, why should you send your paper to MSI? It is a fair and obvious question. I have given some thought as to what I think makes for a good journal. First and foremost, a good journal publishes high-quality research. Second, a good journal offers rigorous and timely refereeing. Third, the presentation (language, grammar, figures, etc.) should be top notch. These are the principles we strive to uphold at MSI.
Unfortunately, I regret to report that we have not made as much progress to this point as I would have hoped. We had planned for our inaugural issue to be published in March 2019. We need 6 accepted papers for an issue to be published; sadly we only had 2 (plus 3 more requiring minor revisions). In order for the journal to be indexed, we need to publish 25 papers per year. I believe that indexing is a must have, but if we can meet our quarterly issue targets (6 per quarter), then the goal of having MSI indexed is achievable.

I believe we are at a crossroads when it comes to the viability of our journal. The success of our Society's journal depends critically on the participation of the Society. In what will certainly be one of my last acts as a member of the CAIMS Board, I submit to you a call to arms. Send us your good papers! Propose special issues associated with conferences or workshops that you organize or in which are otherwise involved! We can make this happen if we pull together!

At the end of the Annual General Meeting this year, I will officially step down from the CAIMS Board. I wish to again thank the Board members who served with me and who continue to serve, and I wish to thank each and every member of the Society for their participation and support of our cause. The past six years have been a hell of a ride, as they say, and I am looking forward to seeing the Society continue to work its wonderful magic. It will just be more from the sidelines.

Motion (Ray Spiteri/Lucy Campbell): Accept the Past President’s report. Carried.

d) Treasurer

Lucy Campbell presented the following report as CAIMS•SCMAI Treasurer.

In the past year, I have accomplished the following:

1. Changing of CAIMS’ financial year-end: At the 2017 AGM, the CAIMS membership voted to change the year-end from April 30 to January 31. The CRA approved this change in 2018. This means that the 2017-18 year ended on April 30, 2018, but the 2018-19 year ended on January 31, 2019, so it was a short (9-month) year.

2. Preparation of a review engagement for the 2017-19 with accountant Michael Northcote: Since CAIMS received more than $10,000 in “public funds” (from the Fields, PIMS and University of Alberta) in 2016-17, we determined that it attained the status of a soliciting corporation, as of July 19, 2017, the 2017 AGM date. Hence, we needed to do a review engagement. This should have been done last year but we did not have time. Hence this year we prepared a review engagement covering two years, 2017-18 and 2018-19).

The review engagement involves a compilation of financial information as done in previous years, plus additional written information describing the accounting practices of the corporation, the responsibilities of the management of the corporation for internal control and fraud prevention, information related to significant events, comparisons between consecutive years, among other details. The
accountant verifies that all the information reported is correct. The review engagement was sent to the members 21 days before the AGM, as required. Once it is approved by the directors, it will be sent to the CRA.

Because this was the first review engagement and it covered two years, a lot of information had to be compiled, hence the accountant fee was quite high, $10,735 (including HST). Since the nature of CAIMS’ activities and financial transactions hardly changes from one year to the next, in future, preparing a review engagement would involve making updates to the written information, preparing the current year’s financial statement and making the required comparisons to that of previous years. Hence, it will easier and less expensive.

Since CAIMS had a gross annual revenue over $50,000 in 2018-19, this means that by default an audit would again be required at the end of the 2018-19 financial year. By passing a resolution at the AGM, we can opt for a review engagement instead.

CAIMS must formally appoint an accountant for 2019-20. Since Michael Northcote is familiar with CAIMS, we propose appointing him as the accountant for 2019-20. Most of my communication with him is done by email so he can continue to work with a treasurer who is not based on Ottawa.

I also recommend that CAIMS hires a bookkeeper to compile financial transactions throughout the year using accounting software. This will reduce the number of hours of work the accountant will need to do at year-end. Michael has recommended a bookkeeper who has experience with similar corporations and has worked with him before, but is not employed by him.

3. Submitting the 2018-19 Tax Return, HST Return and other documentation to the CRA and Corporations Canada. Michael has submitted the tax return and the HST return for 2018-19. There is no tax due. I have paid the HST due for 2018-19: $4931.14. Because this was over $3000, CAIMS has to pay 4 quarterly installments for the next year. To avoid possible penalties, I have paid all 4 installments at this time.

I will also submit the annual return to Corporations Canada along with the updated list of directors.

4. Updating CAIMS’ Articles of Continuance to include a dissolution clause: This is required now that CAIMS is a soliciting corporation.

5. Written agreement between CAIMS and Fields for the Industrial Math Award: Complied information for a draft agreement; a final version has now been signed by the Fields Director and CAIMS President.

6. Set up of registration forms on Regonline for online payment of membership and conference registration fees. The Regonline system will be retired on December 31 and replaced by a new system Cvent. I will look into this to see whether our
existing Regonline forms can be copied over or if we need to set up entirely new forms in Cvent.

7. **Other day to day Treasurer duties:** issuing and depositing cheques, processing credit card payments for membership fees and ad revenue, preparing and sending out invoices, etc.

*Motion (Lucy Campbell/Brian Wetton): Accept the Treasurer’s report. Carried.*

(Note: It was followed by agenda items 9, 8, 10 and 11)

e) **Communications Officer**

Kathleen Wilkie presented the following report as CAIMS•SCMAI Communications Officer.

**Summary of Activities for period June 2018 - June 2019:**

1. Website
   a. The new website went live.
   b. Page updates were made to prize / award pages, committee pages, etc.
   c. Operations Manual document was updated on website.
   d. Math Bio working group has access to update their page independently.
   e. New nomination process set up - website accepts nomination packages.

2. Email addresses moved over from old server (CACloud) to new server (SiteGround)
   a. Note currently we pay for both servers as the domain name is still locked to CACloud, hopefully CACloud will not be renewed in Fall 2019.

3. New e-newsletter application on new server set up and working with a fresh look

4. Infrequent social media posts (facebook) promoting the new website, new journal, new programs in Canadian Universities, or job opportunities

5. Award nominations were opened / closed and packages distributed to committees. Award plaques were ordered for the 2018 and 2019 winners.

6. New Activity Group leader announced for the Fluids Group: Dr. Olga Trichtchenko
   a. Email list of current / lifetime members was created for fluids activity group

7. New promotional material was designed to advertise CAIMS at events we sponsor

8. Obtained a quote for integration of membership management system and payment system into our new website. It is quite high, so I will seek another quote. The system should be able to:
   a. Contain membership information, activity group membership, etc.
   b. Accept payments for memberships and annual meetings.
   c. Providing voting for elections.

**Future Directions**
1. Maintenance of the website will be an issue over the years. The website is powered by WordPress and various application add-ons. These need frequent updates and incompatibility issues may one day arise. Further, security and accessibility standards will need to be periodically checked and updated. I suggest we explore a service maintenance plan to support the website. This would require minimal time commitment, maybe an hour a month or so from a professional. Such service plans exist and I will explore options and obtain quotes.

2. CAIMS supports many events across Canada but the process to request funding is not well known. I will design a new webpage that details the process of requesting funds, the expected advertisement of our sponsorship, guidelines for use of our logo, etc.

3. The caims.ca domain name is still locked to our old web hosting service CACloud. After the annual meeting I will begin the process of moving this over to SiteGround, the process will involve a 24 down-time of the website. I will also assign the communications-officer@caims.ca email address to the domain name instead of the current user who is no longer an executive member.

4. Website will be updated to reflect the location of the 2020 annual meeting (held jointly with SIAM in Toronto) and I will also retire this year’s meeting webpage.

5. Investigate ways to reduce spam/spoofing on caims.ca email addresses.

Motion (Kathleen Wilkie/Thomas Hillen): Accept the Communications Officer’s report. Carried

f) Secretary

Justin Wan presented the following report as CAIMS•SCMAI Secretary.

E-News & Annual Newsletter

We have a facelift for the E-news (thanks to Kathleen)! In the past year, there were 9 issues of E-News sent out. The main contents were announcements of CAIMS activities as well as events from other institutions. The Annual Newsletter was sent out in December, 2018. It included reports from the Society, memberships of various Committees, recent award recipients, and general news from CAIMS sponsored activities and other institutes and societies.

Mailing List & E-Voting

The CAIMS mailing list is completely derived from the CAIMS member database. It is updated every year when the CAIMS membership is renewed. Thus members who want to receive news from CAIMS should renew their membership in a timely manner. Similarly, the voter list is updated every year for the online voting system. Only current CAIMS members are eligible to vote.

Election

CAIMS Election was held in March-April 2019 for four positions on the Board of Directors: President-Elect, Treasurer, and two new Directors.
Thomas Hillen will become the new President of CAIMS, Matt Davison will become the Past-President, and Ray Spiteri has served his tenure. There were two nominees for President-Elect (Troy Day and Rebecca Tyson). The votes were collected and tallied by the online system. The candidate with the highest votes was Rebecca Tyson and she will be the President-Elect for a two-year term. We thank Troy Day for standing and Ray Spiteri for his incredible service.

David Iron was elected Treasurer (three years) by acclamation. We thank Lucy Campbell for her excellent service to CAIMS in the past 5 years.

Ion Bica and Frithjof Lutscher were elected Directors by acclamation. They will join the Board of Directors for a three-year term. We thank Jane Heffernan and Tony Ware for their services to CAIMS.

The election results will be ratified by the CAIMS members at the Annual General Meeting.

This year, we have a total of 94 members voted, which is higher than last year (80+). The total number of eligible voters is 220, and the voting rate is around 43%. The voting rates were 38% in 2018 and 25% in 2017.

Motion (Justin Wan/Steve Ruuth): Accept the Secretary’s report. Carried.

7. Appointment of interim directors to replace David Iron and Rebecca Tyson

Olga Trichtchenko will replace David Iron as the interim Director for one year term. Ray Spiteri will replace Rebecca Tyson as the interim Director for one year term.

Motion (Justin Wan/Colin MacDonald): Approve the interim Directors appointments. Carried.

8. Special resolution to approve the Articles of Amendment – Statement regarding the distribution of property remaining on liquidation

(Presented after the Treasurer’s report) The Canada Not-for-profit Corporations Act states that if a corporation qualifies as a soliciting corporation, then it is required to include a statement in its articles that it will distribute any remaining property it may have when it winds up its affairs, to a qualified donee as that term is defined in the Income Tax Act. The Corporation now qualifies as a soliciting corporation; therefore, it needs to amend its articles to change the provision that it currently has in section 9 of its articles of continuance (Statement regarding the distribution of property remaining on liquidation), to the provision required by the Canada Not-for-profit Corporations Act.

IT WAS RESOLVED AS A SPECIAL RESOLUTION THAT:

1. the Articles of Amendment of the Corporation, which had been submitted to this meeting and were annexed as Schedule “A” in the agenda were approved, subject to any revisions that may be required by Corporations Canada; and

2. any one director or officer of the Corporation is authorized to take all such actions and execute and deliver all such documentation, including the annexed Articles of
Amendment, which are necessary or desirable for the implementation of this resolution, including filing or causing to file the Articles of Amendment with Industry Canada.

Amendment Schedules. The wording in section 9 of the Articles of Continuance of the Corporation is deleted and replaced with the following:

Any property remaining on liquidation of the Corporation, after discharge of liabilities, shall be distributed to one or more qualified donees within the meaning of subsection 248(1) of the Income Tax Act (Canada).

Motion (Lucy Campbell/John Bowman): Approve the special resolution. Carried.

9. Receipt of financial statements for the financial year ended January 31st, 2019

(Presented after the Treasurer’s report) Lucy gave a report on the financial statement, prepared by the accountant Michael Northcote for 2018-19. She explained what needed to be reported in the financial statement, under the Canadian generally accepted accounting principles. She commented and gave brief explanation on items on the report, including the current assets and liabilities, revenue, operating expenses, the 2018 CAIMS conference revenue and expenditure, and the current balance.

Motion (Lucy Campbell/Ion Bica): Accept the financial statement for 2018-19. Carried.

10. Appointment of a public accountant for 2019-20

(Presented after the Treasurer’s report) Since CAIMS is a soliciting corporation, it is required to appoint a public accountant to prepare a financial statement at the end of the financial year.

Motion (Lucy Campbell/Matt Davison): Appointment of public accountant, Michael Northcote, for 2019-20. Carried.

11. Resolution to conduct a review engagement for 2019-20 instead of an audit

(Presented after the Treasurer’s report) A soliciting corporation with annual gross revenue above $50,000 is required to perform an audit. The resolution is to allow CAIMS to conduct a review engagement in place of a full audit.

Motion (Lucy Campbell/David Iron): Resolution to conduct a review engagement for 2019-20. Carried.

12. Confirmation and Ratification of Election of Directors

We need to ratify the results of the election.

There were two nominations for President (Troy Day, Rebecca Tyson). The candidate with the most votes was Rebecca Tyson. We thank Troy for standing.

There was one nomination for the position of Treasurer, and David Iron was elected by acclamation.
There were two nominations for the two positions of Directors. Ion Bica and Frithjof Lutscher were elected by acclamation.

*Motion (Matt Davison/John Bowman): Ratify the result of the election and appoint Rebecca Tyson as a Director and President; David Iron as a Director and Treasurer; Ion Bica and Frithjof Lutscher as Directors, of the Corporation.*  
*Carried.*

13. **Other Business and Termination of Meeting**

*Motion (Matt Davison/Mark Reesor): Adjournment (1:22pm).*  
*Carried.*
Committee Membership

1. Cecil Graham Doctoral Dissertation Award Committee:
   Alexei Cheviakov (Chair, Saskatchewan), Matthew Betti (Mount Allison), Colin MacDonald (UBC), Stephanie Portet (Manitoba).

2. Arthur Beaumont Distinguished Service Award Committee:
   Sharene Bungay (Chair, Memorial), Pauline van den Driessche (UVic), Gerda de Vries (Alberta).

3. CAIMS Research Prize Committee:
   Hermann Eberl (Chair, Guelph), James Feng (UBC), Jimmy Garnier (France), Leon Glass (McGill), Gordon Swaters (Alberta).

4. CAIMS-PIMS Early Career Award Committee:
   Connell McCluskey (Chair, WLU), Sue Ann Campbell (Waterloo), Bahman Gharesifard (Queen’s), Weiran Sun (SFU), Hao Wang (Alberta).

5. CAIMS-Fields Industrial Mathematics Prize:
   Kumar Murty (Chair, Fields Director), Ian Frigaard (UBC), Kirsten Morris (Waterloo), Vakhtang Putkaradze (Alberta), Tom Salisbury (York).

6. Nominating Committee:
   Rebecca Tyson (Chair, President-Elect), Justin Wan (Secretary), David Iron (Treasurer), Kathleen Wilkie (Communications Officer).

7. Membership Committee:
   James Watmough (Chair, UNB), Alexander Bihlo (Memorial), Amy Hurford (Memorial), Colin MacDonald (UBC), David Iron (Treasurer), Justin Wan (Secretary).

8. Liaison Committee:
   Jacques Belair (Montreal), Lucy Campbell (Carleton), Shaohua Chen (CBU), Troy Day (Queen's), Matt Davison (Western), Rod Edwards (UVic), Bin Han (Alberta), Tony Humphries (McGill), Cody Hyndman (Concordia), Silvana Ilie (Ryerson), Ken Jackson (Toronto), Serpil Kocabiyk (Memorial), Theo Kolokolnikov (Dalhousie), Shaun Lui (Manitoba), Roderick Melnik (WLU), Paul Muir (St. Mary's), Isreal Ncube (Memorial), Bartek Protas (McMaster), Steve Ruuth (SFU), Ray Spiteri (Saskatchewan), Ken Sulston (UPEI), Jose Urquiza (Laval), Justin Wan (Waterloo), Tony Ware (Calgary), James Watmough (UNB), Brian Wetton (UBC), Hongmei Zhu (York).
Report on CAIMS•SCMAI 2019

By Weiran Sun

The 2019 annual meeting of the Canadian Applied and Industrial Mathematics Society (CAIMS) • Société Canadienne de Mathématiques Appliquées et Industrielles (SCMAI) was hosted by Simon Fraser University in Whistler, British Columbia. The meeting highlighted six main themes: Compressed Sensing/Data Science, Scientific Computing, Math Biology & Mathematics in Health Sciences, Fluid Dynamics/Industrial Applications, Applied Analysis and PDEs and Mathematical Finance. Each theme was led by a plenary speaker. Four prize talks were also given at this meeting: the 2018 CAIMS Research Prize winner Leon Glass (McGill University), the CAIMS-Fields Industrial Mathematics Prize winner Jianhong Wu (York University), the CAIMS Cecil-Graham Doctoral Dissertation Award winner Amir Maleki (The University of British Columbia) and the CAIMS-PIMS Early Career Award winner Bahman Gharesifard (Queen's University). Local meeting organizers included Weiran Sun and Manfred Trummer.

The conference was well attended, with 51 CAIMS/SCMAI members, 51 non-members, and 85 students and post-doctoral researchers. There were approximately 187 attendees in total, with a strong international presence and young research presence. An NSERC information session was hosted at the meeting. This year the poster session was combined with the contributed sessions and there were 9 titled contributed sessions inline with the six main themes of this conference. There was also a special session of Math and Music which had a high attendance.
CAIMS President, Thomas Hillen and CAIMS 2019 Co-organizers: Manfred Trummer and Weiran Sun.
It is a great honor for the Canadian Applied and Industrial Mathematical Society to present the Research Prize to Dr. Leon Glass from McGill University. Dr. Leon Glass, a fellow of the Royal Society of Canada, has made seminal contributions to research, education and community leadership.

His early research on dynamic genetic networks in the 1970’s and 80’s has laid the foundation of major developments in systems biology. Through L. Glass’ work, tools from dynamical system theory became available for the analysis of large genetic networks.

In collaboration with M Mackey, L. Glass studied delayed feedback control in physiological systems. They found, for the first time, that chaotic dynamics arise naturally in such feedback systems. Their paper in Science from 1977 has more than 4000 citations and their model is now known as the Mackey-Glass equation.

A special interest of L. Glass is the analysis and detection of cardiac arrhythmias. He and his colleagues could show the existence of chaotic dynamics in embryonic chicken heart cells, which was the first demonstration of chaotic behavior in a biological system. J. Gleick wrote in his popular science book “Chaos” about Glass that this was “one of the most talked about lines of research in the whole short history of nonlinear dynamics” (1987). L. Glass’ research on cardiac arrhythmias culminated in patents for a detection software of cardiac arrhythmias.

L. Glass is a true interdisciplinary researcher, with publications in mathematics, biology, and physiology journals. He educated students in all these disciplines and guided them to fully interdisciplinary research. His work is unique within our Society and his career is a role model for the next generation of mathematical physiologists.
2018 CAIMS•SCMAI Cecil-Graham Doctoral Dissertation Award

Dr. Amir Maleki (UBC) is named the recipient of the Cecil Graham Doctoral Dissertation Award in recognition of a high-quality, insightful thesis addressing multiple aspects of modeling displacement flows used to cement wells in oil and gas industry. They employed a variety of mathematical methods to model, analyze, and simulate turbulent and mixed displacement flow regimes, and applied their results to examine the validity of existing industrial practices.

2019 CAIMS-Fields Industrial Mathematics Prize
Prof. Jianhong Wu (York University) is named the recipient of the CAIMS-Fields Industrial Mathematics Prize in recognition of their many contributions to dynamical systems in mathematical epidemiology and in particular, their collaborative research with public health professionals in government and industry: applying their expert knowledge to infectious disease mitigation strategies and preparedness.

---

### 2019 CAIMS-PIMS Early Career Award in Applied Mathematics

![Image of award recipients](image)

Prof. Bahman Gharesifard (Queen's University) is named the recipient of the CAIMS/PIMS Early Career Award in recognition of their cutting edge work on the advancement of theory in the network sciences, and for novelty and breadth in applications in social, biological, and economic networks.
**2019 Arthur Beaumont Distinguished Service Award**

Prof. Lucy Campbell ( Carlton University) is named the recipient of the Arthur Beaumont Distinguished Service Award in recognition of their outstanding service to CAIMS/SCMAI as two-time co-organizer of the Canadian Symposium on Fluid Dynamics, active contributor to Annual Meetings, Board Member, and for serving above and beyond in the role of Treasurer.

**2019 CAIMS•SCMAI Research Prize**

Prof. Pauline van den Driessche (University of Victoria) is named the recipient of the CAIMS-SCMAI Research Prize in recognition of their contributions to Mathematical Epidemiology and Matrix Analysis, and the high impact of this work in many areas of Applied Mathematics more generally.
Recognition of Service to CAIMS 2019

Ray Spiteri as President-Elect, President and Past-President, 2013-2019.

Lucy Campbell as Treasurer, 2014-2019.
CAIMS•SCMAI 2019 Election: Call for Nominations

by Justin Wan

CAIMS•SCMAI will be holding an election in March 2020 for:

- Secretary
- Two Director positions on the CAIMS Board of Directors

The Secretary position will be vacated by Justin Wan. The term of Justin Wan will come to an end in 2020. The Secretary position will be for a three-year term. The two Director positions will fill the positions to be vacated by Ray Spiteri and Olga Trichtchenko whose terms will come to an end in 2020. The Director positions will be for a three-year term.

All members of CAIMS•SCMAI are invited to put forward names of candidates for these offices. Nominations should reach the CAIMS Secretary, Justin Wan (secretary@caims.ca) by January 31, 2020.

CAIMS•SCMAI Distinguished Mathematical Biology Lecture
by Pauline van den Driessche

2019 CAIMS Distinguished Lecture in Mathematical Biology was given by Dr. Simon Levin (Princeton University) at the University of Victoria (UVic), on the occasion when he was there to receive an Honorary Doctoral Degree from UVic. Local colleagues (including Junling Ma, Pauline van den Driessche, Barbara Hawkins and Real Roy) from the Department of Mathematics and Statistics and the Department of Biology at UVic also took advantage of Dr. Levin's presence to organize a very successful one-day workshop "Levin Fest", A Symposium at the intersection of mathematics and biology. This day featured the keynote CAIMS lecture by Simon Levin: “Public Goods from Biofilms to Society”, followed by plenary talks by Mark Lewis (University of Alberta) and Carla Staver (Yale University) as well as 13 additional talks from Fest participants, and a lunchtime forest walk led by Barbara Hawkins. Many thanks to CAIMS for supporting this distinguished lecture.
Thanks to the high quality work at UVic in recording both Dr. Levin's public lecture and the CAIMS plenary lecture, as well as to Kathleen Wilkie (Applied Mathematics, Ryerson University) in posting the two videos on the CAIMS YouTube channel, colleagues can now watch them on YouTube:

A. Distinguished Lecture:
   https://www.youtube.com/watch?v=-vNfVkJfjk

B. Keynote Lecture at "Levin Fest"
   https://www.youtube.com/watch?v=1mU6ca52T_I

These are also added to the links to the Mathbio Group's website.
News from the Centre de Recherches Mathématiques

by Véronique Hussin and Suzette Paradis

The year 2019 at the CRM started with major conferences. In January, Vadim Kaloshin (University of Maryland) delivered three fine talks within our yearly CRM Nirenberg Lectures in Geometric Analysis series.

Our 50th anniversary scientific monthly programs resumed in March and continued until November 2019. There were renewed fascinating subjects and seasoned speakers throughout the last year of a two-year anniversary organization. First off, a program on New Developments in Free Probability and Applications comprised of workshops and the Aisenstadt Chair lecture series, by Alice Guionnet from CNRS and ENS Lyon in France.

In April, we offered two tutorials and two workshops under a program on Topological and Rigorous Computational Methods for High Dimensional Dynamics. In May, a spring school and a workshop on Faces of Integrability lasted 10 days. It was closely followed by another program this time on Data Assimilation: Theory, Algorithms and Applications. The training school was focused at developing the fundamental mathematical and computational tools which underpin the subjects of data assimilation, machine learning, and inverse problems with three experienced lecturers Eldad Haber (UBC), Sebastian Reich (Institut Für mathematik der Universität Potsdam) and Andrew Stuart (Caltech). Distinguished lecturer Andrew Majda was also part of this program.

The June program was about Homological Algebra, Microlocal Analysis and Symplectic Geometry and offered minicourses as well as a series of conferences on the subject. Our July monthly program on Expansions, Lie Algebras, and Invariants was divided into three parts: introductory talks by organizers, followed by conferences, and finally, workshops. It was followed in August by mini-courses and lectures as well as a workshop on Quiver Varieties and Representation Theory.

In September of 2019, the CRM welcomed two lecture series with Ciprian Manolescu (Stanford), an Aisenstadt Chair, and Lisa Picirillo (Texas) for CIRGET, within the Low-Dimensional Topology program. An ISM- Discovery School was given by Kristen Hendricks (Rutgers), Francesco Lin, Matthew Stoffregen (MIT), and Claudius Zibrowius (UBC), and finally a conference called Codimension One Phenomena in Low-Dimensional Topology was held with several invited speakers.
In October 2019, the official launch of the thematic program Mixed Integer Non-Linear Programming: Theory and Computation was given by Dr Ruth Misesner’s talk entitled Scheduling and Rescheduling: Explainability, Methods, and Industrial Applications. Other distinguished visitors were also featured during the month, namely: Amitabh Basu (Johns Hopkins U, USA), Claudia D’Ambrosio (CNRS, France), Marcia Fampa (Universidade Federal do Rio de Janeiro, Brasil), Jean-Bernard Lasserre (CNRS, France), and Jon Lee (U Michigan, USA). Finally, Professor Andrea Lodi from Polytechnique Montréal, organized a joint CRM DIMACS three-day international workshop on Mixed-Integer Nonlinear Programming.

In November 2019, three workshops on Mathematical Physiology were being presented on Better Health Through Mathematics, with the support of the Society for Mathematical Biology. Apart from these captivating programs, we welcomed a variety of public lectures: Mark Lewis (Alberta and CMS) on Understanding Animal Movement Patterns with a Mathematical Eye; Christian Genest (McGill) on How to Evaluate Environmental Catastrophes as well as Mina Teicher (Bar-Ilan University, Israël) on The Beauty of Mathematics.

Two major scientific activities were also organized and hosted by the CRM: the XIth International Symposium - Quantum Theory and Symmetries, and the SMB 2019 Annual Meeting of the Society for Mathematical Biology.

Our Simons CRM scholar-in-residence Program has benefitted renewed participation of over 50 scholars this year thanks to the generous fund. The annual Industrial Problem Solving Workshop was jointly organized by IVADO and provided companies and institutions with mathematical tools for solving problems, and enabling academic researchers in applied mathematics to work on real-world problems. Furthermore, this year’s summer school called Séminaire de mathématiques supérieures, created in 1962, concentrated on Current Trends in Symplectic Topology. The 2020 summer school will concentrate on Discrete Probability, Physics and Algorithms.

In 2019, the prize winners were the following: the André-Aisenstadt Mathematics prize went to Yaniv Plan (UBC); the CRM-Fields-PIMS recipient was Nassif Ghoussoub (UBC); the CAP-CRM winner was Jaume Gomis (Perimeter Institute for Theoretical Physics), and Johanna Nešlehová (McGill University) was awarded the CRM-SSC prize.

November 27 also marks the end of the 50th anniversary program of the CRM. It will be celebrated by a conference by Persi Diaconis from Stanford University on Adding Numbers and Shuffling Cards.

The year 2020 will start with a thematic semester from January to June on The Mathematics of Decision Making. One of its aim is to illustrate how recent advances in artificial intelligence will expand the range of practical industrial and societal problems that optimization methods will have to address in the near future. This rich program will be followed by a thematic semester on Number Theory – Cohomology in Arithmetic from August to December 2020. Finally the first semester of 2021 will be on Probability & PDEs.
For more information on the overall programs at the CRM, please visit: http://www.crm.umontreal.ca

---

**News from Pacific Institute for the Mathematical Sciences**

by Jimmy Fryers

**PIMS** PIMS supports a wide range of activities in research, non-academic collaborations, education, and outreach in the mathematical sciences. This includes workshops, conferences, distinguished lecture series, a postdoctoral program, industrial innovations, Collaborative Research Groups, and more. These activities take place at our member sites: University of British Columbia, Simon Fraser University, University of Victoria, University of Calgary, University of Alberta, University of Lethbridge, University of Regina, University of Saskatchewan, University of Manitoba and University of Washington.

**PIMS News**

In 2019, Callysto, a pilot by Cybera and PIMS was awarded another round of funding by Canada’s CanCode Grant, which will build on the work initiated in 2018 to develop Canada’s digital generation. The Callysto platform helps teachers bring computational thinking into their math, science, social sciences, and humanities courses. It gives grade 5-12 students access to a university level learning program capable of performing big data processing, highly graphic and interactive visualizations, all levels of coding, digital math equations, remote collaboration and a multitude of other innovative functions and tools – all from their web browser. So far, over 750 Canadian teachers have been trained on Callysto. The goal is to expand that number by a further 2000 teachers across the country. They will be provided with intensive training sessions through a combination of face-to-face workshops and self-directed online learning modules. They will also be offered supplementary training and have access to learning modules and lesson plans that can be used in their classrooms. The program will also make funding available for educators to run computational thinking and coding events for students across the country.

Syzygy.ca is a project convened by PIMS, Compute Canada and Cybera to bring Jupyter notebooks to researchers, educators and innovators across Canada. This web browser-based tool has continued to grow since its inception in 2017 and is currently used by over 20,000 students in 20 universities across Canada, and these numbers continue to grow. In September 2019 alone, 4,000 additional students gained access to and used Syzygy. There are big plans for Syzygy in 2020 as we aim to build upon the success of the Syzygy experiment and seed an initial node of a consortium in Canada with the intention of fostering a global network of people invested in advanced interactive computing.
PIMS Scientific Activities
At the core of PIMS activities are the Collaborative Research Groups, which bring together researchers across many universities to focus on particular topics with funding for conferences, workshops and support of highly qualified personnel, including postdoctoral fellows. This year, PIMS hosted three continuing CRGs in Geometric Analysis, Geometric/Cohomological Methods in Algebra, and High Dimensional Data Analysis. The CRG on High Dimensional Data Analysis is addressing fundamental open questions that limit the industrial uptake of ideas from the mathematics of high-dimensional data and their application in practice. In 2019, they held a minicourse on uncertainty quantification of PDEs with random coefficients, and a four-day CRG Summer School on Deep learning for Computational Mathematics.

PIMS supports a large number of postdoctoral fellows, through matching funding with the ten university sites that make up the PIMS distributed network. These include regular postdoctoral fellowships; industrial postdoctoral fellowships; CNRS/PIMS fellowships that bring in young researchers from France to work with research groups in the PIMS network; and the PIMS-Europe Fellowship program with the goal of developing and supporting research collaborations between mathematical scientists at PIMS member universities and researchers across France. These fellowships last at least two months and will champion a mutual exchange of knowledge and talent while encouraging transatlantic research on the frontline of the Mathematical Sciences. We also offer the PIMS-Europe Student Mobility Program, which has two components: one is to support 12-24 week visits by students from France to carry out research at PIMS member universities and the other is to support visits by students and postdoctoral fellows from PIMS member universities to carry out research in France. We are pleased to announce that in 2020 we will offer the PIMS-CNRS Postes Rouges, which provides a limited number of 3-month research positions in France, available to visitors from the PIMS member institutes.

PIMS conferences and workshops include those connected to the CRGs, ongoing lecture series, as well as individual events such as:

- PIMS Workshop on Mathematical Sciences and Clean Energy
• Canadian Operator Symposium
• Alberta Number Theory Days
• Maryam Mirzakhani Day
• Scientific Computing, Applied and Industrial Mathematics (SCAIM) Seminar

We also have seminars in:

• Math & Philosophy
• Applied Math
• Discrete Math
• Probability
• Math Biology
• Data and Computing

Speakers to these events come from around the world and include everyone from graduate students to leading international researchers and Fields Medalists.

This year PIMS hosted the 2019 Diversity in Math Summer School, a multi-year, multi-level program geared towards promoting diversity and inclusivity in STEM. The two week annual program includes:

• An interactive math day camp for high school students from groups that are consistently under-represented in the STEM fields. The aim is to increase their representation and retention at post-secondary institutions in STEM fields.
• A national summer school that inspires talented undergraduate women to specialize in a mathematics-related field at the graduate and post-graduate level and consider career options focused on science and mathematics.
• A creative forum for mentorship and leadership at all levels, where the undergraduate participants learn to serve as mentors for their younger counterparts.

*Undergraduate Participants at the 2019 PIMS Diversity in mathematics Summer School*
PIMS Industrial Activities
On the industrial side, bcdata continues working towards it’s goal of creating the data science community for BC through a collaborative effort to intertwine people from government, industry, universities and not-for-profiles. The 2019 bcdata colloquium series is kicking off with talks from Clir Renewables, Caliber Data Solutions, and Hootsuite. The series also received a significant boost through partnership involvement from Avigilon, CANSSI, the Institute of Applied Mathematics, and UBC Sauder School of Business.

Networking events include hosting the Lunchbox Lecture Series which brings mathematical research to local industry, with talks on a wide range of topics. This year we hosted presentations on solving real world problems: computational algorithms and sparse solutions of linear and nonlinear systems.

PIMS Education Activities
PIMS education activities include Math Mania, ELMACON, Summer Schools, Public Lectures and Distinguished Speakers, all which reach out to students and teachers in K-12 to help build the educational experience in the elementary and senior grades. We are extremely grateful to our education coordinators, who supervise and run these activities across our PIMS network. The annual Emerging Indigenous Scholars Summer Camp ran as usual with students benefitting from internships across the UBC campus, including in TRIUMF, the Stuart Blusson Quantum Matter Institute, the Marine Zooplankton Laboratory of the Department of Earth and Ocean Sciences, and the Zandstra Stemcell Lab.
In 2020, expect more exciting workshops, seminars, lecture series and industrial activity through PIMS. There are numerous events that we have supported for many years that will continue in 2020, including:

- PIMS Distinguished Colloquium
- Probability seminars
- Algebraic Geometry seminars
- Hugh C. Morris Distinguished Lecture Series
- Scientific Computing, Applied and Industrial Mathematics (SCAIM) Seminars
- Pacific Northwest Geometry Seminar (PNGS)

There will also be a number of other high-profile events, such as the PIMS-CRM Summer School in Probability, and the PIMS-Germany Summer School on Eigenvarieties.

PIMS always welcomes proposals for new activities; small events can be proposed at any time, large events have an October deadline for the coming year, postdoctoral applications have deadlines in December. Calls for funding proposals are announced through the PIMS website www.pims.math.ca, as are all our upcoming activities.
SMB 2019 – A Showcase for Canadian Mathematical Biology

by Jacques Bélair, Université de Montréal

Following Vancouver (2008) and Toronto (2009), the annual meeting of the Society for Mathematical Biology (SMB) was back in Canada, this time in Montréal: a record number of 623 participants from 27 countries attended SMB2019 at Université de Montréal, from 21 to 26 July 2019. The theme of the Conference, « From Genome to Biome », reflected the diversity of fields, as well as scales of biological organization, of the presentations. Up to eleven parallel sessions in a single building allowed for significant interactions, during and between the sessions, among the participants.

The ten plenary speakers presented superb presentations, all greatly appreciated by the audience. To describe only five of them:

a. Arthur Sherman, the Arthur Winfree Award winner, inaugurated the conference by presenting the latest developments in the treatment of diabetes, highlighting the role of insulin resistance and how dietary behaviour, among a number of factors, can influence it. The speaker predicted to members of the audience the dynamics of the weight expected to be gained by the end of the Conference;

b. Kim Cuddington presented the importance of relative time scales in the definition of "survival" of a species, the study of asymptotic behavior being a misleading criterion when, for example, a parasite could have mortally attacked its host before disappearing itself;

c. Morgan Craig, one of the winner of the Lee A Siegel Prize, and Carolin Colijn presented how data integration guides the construction of models, identifying the most important regulatory structures requiring detailed representation, for cell control in the first case, and transmission of infectious diseases in the second case;

c. Nick Monk, recipient of the John Jungck Award, presented the fruits of his long and successful teaching experience, emphasizing the interdisciplinary nature of mathematical biology training, and the extent to which new teaching configurations (Summer Schools, "Boot Camps") bringing together students from various initial backgrounds (biology, mathematics, physics) are absolutely essential to prepare future researchers in the field of mathematical biology.

Some 90 sessions of specialized minisymposia were the heart of the Conference, covering topics as diverse as the spread of vector-borne diseases (such as Dengue), immunotherapy in support of oncology interventions, the role of data processing in drug development, and the survival of endangered species, including bees as well as marine species. Nearly 100 oral contributed and 129 poster presentations took place.

Lunchtime was used for exchanges by panelists on the subjects of "Rules of Life in the Context of Future Math Biology" and "Data Science Education for Biology », and a "Women's Lunch" was held as well. The high point of the social activities was the Wednesday dinner, which was held at the home of the Canadiens hockey club with a visit on the (not quite iced at this time of the year) rink and backstage, including the local players' locker room.
A few features of this Conference are worth noticing:

- The role of electronic communication tools: no paper copy of the program was printed, not even in a one-page summary. In addition, program updates (room changes, speaker cancellations or otherwise changes) were made almost instantaneously on the database used to build the program, and were posted online quickly. Many participants were very active on social media (especially Twitter and Instagram), the Society even awarding a prize to the most active participants "socially" - witness the entries at @SMB_MathBiology for the dates of the Conference and #SMB2019;

- The distribution in professional status of the participants: the majority of them were students or post-doctoral fellows, barely 283 identifying themselves as professors; the gender distribution, although not completely balanced (but the plenary conferences were), nevertheless included 41% female participation;

- "General public" media coverage: Laurent Pujo-Menjouet from the Université de Lyon 1, was invited to discuss his recent book « The Game of Love without Chance - Mathematics of the couple » in both written media (newspapers « The Gazette » and « Le Journal de Montreal ») and electronic media [radio and television interviews (Radio QUB, Radio-Canada and TVA-Nouvelles).

The fine weather allowed participants to soak up the Montréal festive atmosphere. The organizers had envisioned this meeting as a showcase of Canadian Mathematical Biology, and it ended up being successful in this regard: there were 136 Canadian participants, the second largest national group, and 40 % of the Plenary speakers were from Canadian universities. For further (and all) details, the website smb2019.org will remain active for the foreseeable future.

The financial support of the CAIMS Mathematical Biology Activity Group is gratefully acknowledged.
Systems Modeling in the Pharmaceutical Industry Problem Solving Workshop
by Morgan Craig

The inaugural edition of the Systems Modeling in the Pharmaceutical Industry Problem Solving Workshop, jointly sponsored by the Fields Institute and the Centre for Quantitative Analysis and Modelling (CQAM), was held at the Fields Institute on August 12-16, 2019. This week brought together graduate students, postdoctoral fellows, and pharmaceutical industry leaders to solve industrial problems centred on cardiac physiology, cancer target identification (including strategies to overcome drug resistance), autoimmune neutralizing antibodies, and cohort/patient stratification in rare genetic diseases.

This problem solving workshop gave participants an introduction to quantitative systems pharmacology (QSP), an emerging field emphasizing the development of mathematical models combining the system of interest (the whole body, the immunological system, the cardiac system etc.) to quantitatively and holistically answer pharmaceutical questions.

Participants received training in QSP approaches from the internationally recognized QSP field leader (Dr. Cynthia J Musante, Pfizer) who gave a keynote address, and in introductory pharmaceutical sciences lectures on pharmacokinetics and pharmacodynamics (Dr. Morgan Craig, Université de Montréal, and Dr. Timothy Nicholas, Pfizer). Doctoral candidate Paul Malick from Dr. Andrea Edgington’s group at the University of Waterloo gave an excellent introduction to physiologically-based pharmacokinetics, including a survey of the Open Systems Pharmacology software, that was accompanied by a Mathworks presentation on Matlab tools for QSP.

The week was dedicated to solving four problems from our industrial leads (Dr. Nicholas, Dr. Bart Borek, Vertex Pharmaceuticals, Dr. Dean Bottino, Takeda Pharmaceuticals, and Dr. Anna Kirpichnikova, Stirling University). Topics included: 1) Dose selection rationale for type I interferon neutralizing antibody, 2) Response threshold analysis in exposure-response and pharmacogenetic translational applications, 3) Immuno-oncology: Evaluating Strategies for overcoming rituximab resistance via modulation of Antibody-Dependent Cell-mediated Cytotoxicity & Phagocytosis (ADCC & ADCP), and 4) Cardiovascular QSP Modeling: Virtual Ventricular Cell Case Study.

Throughout the week, participants received hands-on and translatable learning about their specific biological application in addition to the PK/PD and QSP techniques. Even with tight timelines, each group presented a polished and professional presentation at the end of the workshop that advanced knowledge in their field of application. Having gained perspective on the various facets of interest to modellers in the pharmaceutical sciences, students and fellows gained the competencies necessary for industrial research, ultimately contributing to improved health outcomes.
We’d like to thank the Fields Institute and CQAM, together with the generous donations from Applied BioMath, the International Society of Pharmacometrics, Metrum, Pfizer, and an anonymous individual donor for their support in sponsoring this event. Given the success of this first edition, we look forward to running a second workshop in 2020. We are excited to follow the future scientific contributions of the 24 dedicated and talented participants who joined us this year.
Blundon Seminar: Three days at Memorial
A math camp for senior high school students

Margo Kondratieva (coordinator)

In 2019 the Blundon Seminar was held on May 15-17 at Memorial University (MUN). The seminar, essentially a math camp, is an annual event, which aims to empower and encourage mathematically-inclined students from grades 10–12 to pursue further study in the subject at the university level.

Participation in the seminar is by invitation only based on the results of the Blundon, COMC, Euclid (grade 12), Fermat (grade 11), and Cayley (grade 10) contests. This year there were 9 female and 28 male participants who demonstrated consistently good results in these competitions.

The camp has been held every year since May 1982. It is named after Professor W.J. Blundon, who was the first Head of the Department of Mathematics and Statistics at MUN, and an avid problem solver. The seminar traditionally combines intellectual and fun/sport components.

This year Dr. Tom Baird was the acting chair of the Blundon Seminar. There were two excellent talks: “Machine learning and artificial intelligence - how to use math to make computers smarter and avoid getting extinct in the process” by Dr. Alex Bihlo and “Black holes from mathematics to observation, or why some things need to be believed in to be seen” by Dr. Hari Kunduri.

The Mathlethics, an activity where teams of students take turns between solving mathematical problems and competing in various sports, was conducted by Dr. Ivan Booth. Three problem solving sessions were organized by Dr. Danny Dyer and Dr. Ron Haynes.
One of the highlights of the camp was a banquet, during which the winner of the Blundon Contest, Mr. Benjamin Chislett (Holy Heart of Mary High), was presented with the Blundon Shield, and the winners of other contests were also presented with money and book prizes. According to students’ responses, collected after the camp, this event was enjoyable, informative, and memorable for many of them. On behalf of the Blundon Seminar team, I would like to thank our sponsors: the NL Department of Education, CMS, AARMS, CAIMS, Nuport Holdings, the NL Teachers’ Association, Mathworks, Nelson Education, Wolfram, and Memorial University for their continuing support.

---

**Canadian Undergraduate Mathematics Conference (CUMC)**

**July 24-28, 2019, Queen’s University, Kingston**

Chelsea Crocker, President, CUMC Organizing Committee

Queen’s University had the pleasure of hosting the 26th annual Canadian Undergraduate Mathematics Conference. The core of the conference is based on a series of talks given by the participants which gave these young researchers an excellent opportunity to build their presentation skills and learn about mathematics in a new environment. The event welcomed 101 students from all over the country, including British Columbia, Saskatchewan, Manitoba, Quebec, and Ontario; as well as the United States.

The conference had 8 keynote speakers from both academia and industry, covering topics in dynamical systems, geometry, modelling, probability, engineering applications, number theory, and artificial intelligence. The speakers were Bachir El Khadir (Princeton University), *Algebra and Geometry of Polynomials: Theory and Applications*; Karen Rudie (Queen’s University), *Discrete-Event Control to Keep Secrets Secret*; Daniel Wise (McGill University), *An Invitation to Geometric Group Theory*; Ayse Sahin (Wright State University), *Towers, tilings, and dynamical systems*; Marnie Landon (CEO C2 Infinity), *Artificial Intelligence and Emerging Technologies*; Yvan Saint-Aubin (University of Montreal), *A quarter century of percolation*; Felicia Maria G. Magpantay (Queen’s
University), *Mathematics of Imperfect Vaccines*; and Ram Murty (Queen’s University), *What is the Central Limit Theorem?* Besides the talks strictly on mathematical topics, Marnie Landon’s presentation covered its application to current work in industry.

An industry/academia panel, and a diversity panel were also hosted. The first panel was a chance for students to find out what an undergraduate degree in mathematics can lead to. It included Tanner Kotsopoulos (Employee at Microsoft), Steven Vavasis (Professor at Waterloo University), Mike Roth (Professor at Queen’s University), Henry Kavle (PhD student at Queen’s University), Shadi Khalifa (Cognitive Development Hub Centre for Advanced Computing), Stefanie Knebel (PhD student at Queen’s University), and Richard Leyland (PhD student at Queen’s University). In the diversity panel, participants gave explicit examples of their own experiences and offered students advice on perspectives and actions to take when faced with challenges resulting from a lack of diversity in the workplace. A variety of different kinds of diversity were discussed, including gender, sexual orientation, socio-economic status, race, cultural identity, age, neurodiversity, and education level. The panel included Ayse Sahin, Giusy Mazzone (Professor at Queen’s University), Francesco Cellarosi (Professor at Queen’s University), Marnie Landon, Stefanie Knebel, and Tanner Kotsopoulos.
For the participants who wanted to give a presentation in a different way, a poster session was offered where anyone could display a poster and talk about their research in a more informal setting.

In addition to the other activities, there was a variety of workshops that ran during the conference. There were three different mathematical workshops, “Building the 120-Cell” ran by Queen’s Professor Mike Roth where the participants worked together to build the three-dimensional shadow of a regular four-dimensional polytope called a 120-cell, “So Long Sucker: A Game of Negotiation” a game theory workshop ran by Stefanie Knebel and Marie Jose Jerade and a biostatistics workshop ran by Patrick Gravelle a PhD student at Brown University. There was also two different software workshops “Complexity Theory with Python” and “Brief LATEX Introduction” both ran by Queen’s University mathematics undergraduates Daniel Cloutier and Matthew Nicastro.

Not every event, however, was purely academic as we wanted to give the participants the chance to connect with one another in a social environment as well. We ran social events including an opening barbeque which gave students time to meet before the conference kicked off and a movie night where 12 Angry Mathematicians and The Imitation Game were shown. A closing banquet including the students, as well as speakers, was also hosted so that everyone could sit down with a nice meal and the new friends they made throughout the conference.

This year’s CUMC was a huge success and it was all made possible by the generosity and support of the Canadian Applied and Industrial Mathematics Society (CAIMS), the Canadian Mathematical Society (CMS), the Canadian Mathematical Society Student Committee (Stude), the Canadian Society for History and Philosophy of Mathematics (CSHPM), the Fields Institute, the Queen’s University Mathematics and Statistics Department, Tourism Kingston, and the University of Waterloo Faculty of Mathematics.
Math Education Matters!

by Hongmei Zhu, York University

Across Canada, high school students are opting out of math with alarming frequency. Unknown to them, when students drop out of math after grades 9 and 10, they effectively limit future and affluent employment opportunities. Colleagues in CAIMS are determined to reverse this trend with supporting Math4Real, a math enrichment program that shows young people exactly why math matters, fills a curriculum gap, and empowers students with critical math modeling tools required to solve real world problems.

The Math4Real program provides grades 9 to 12 students, their teachers and parents with a deeper understanding of how mathematics can explain our world and experience how mathematics can be applied to everyday life. Moreover, math modelling offers a natural gateway to a post-secondary STEM education because of its ability to both intersect elements and weave together all areas of STEM. Unique in Canada, this math enrichment program provides hands-on experiences by solving real-world problems with scientific analysis and modeling that helps students develop critical thinking, programming, communication and teamwork skills needed in most jobs.

Since officially developed in 2018, the Math4Real program supports and developed these skills through various activities in 2019:

1. February 21-22, Teachers’ workshop “Bringing Computational Thinking and Mathematical Modeling into the Ontario Secondary Curriculum”, joint with Callysto Canada, a free, multimodal learning program for grades 5-12 students in Canada.

2. March 11-13, “Take Modeling Challenge” March Camp, joint with Callysto Canada and Maplesoft Inc. Our special guest speakers are Paulina Chin from MapleSoft Inc. and Richard Richard Hoshino, Quest University Canada who taught the students about “Four Problem-Solving Strategies for Mathematics and for Life”.

46
3. March 11-May 6, National and **International Mathematical Modelling Challenge (IMMC)**, the fourth high school math modeling competition in Canada. Teams of up to 4 students from a same school worked on their own schedule during a 5 day period between March 11th and April 23th, 2019. Each team was given a modeling problem in words and then they constructed their models and solutions. This year’s problem Earth’s Carrying Capacity asked the teams to develop a model that identifies the earth's carrying capacity for human life under current conditions. The Canadian Outstanding Paper was given to **Bayview Secondary School**, Richmond Hill, ON, from **York Regional District School Board** They represented Canada in the international round of judging, competing against 57 best teams from 33 countries/regions. Bayview Secondary were awarded Honorable Mentions, the third prize category. (Note that this year, there is no first price given in the international competition.)

4. **May 11, Science Odyssey** event entitled “Fractals, a path to infinity!”. It is open to public with fun hands-on math activities Science Odyssey is Canada's biggest festival of science and technology with over 1000 activities for explorers of all ages.

5. **June 27, IMMC-Canada Award Ceremony**, winning teams with their teachers and families came to present their solutions and receive recognition of their achievements in the IMMC contest. Hongmei Zhu, York University, gave a presentation on “How Many is Too Many: the population growth models”.

6. **July 8, A mini workshop on “Vibrations and Trig-functions”** gave at CMS Summer Math Camp and joint with Amenda Chow from **Experimental Math Space**.
7. October 19, workshops on “Girls Explore Math” at an one-day “Explore Science” event, joint with Experimental Math Space and Women in Science and Engineering (WISE) at York University

The current successes were build upon the significant contribution from Math4Real committee members, the generous financial support from CAIMS, CMS, the Fields Institute for Research in Mathematical Sciences, and our great partners MapleSoft Inc. and Callysto Canada. Over the next five years, we hope to reach to more high school students, math teachers and parents across Canada. Our overarching vision is to change perceptions of math, revolutionize the high school math curriculum, stimulate excitement about their math learning and get students and their support networks involved in a highly effective approach to STEM education. We believe math modeling has the power to unlock this potential.

In order to accomplish this, we need more Math4Real ambassadors at different universities to spread the words and we will assist with the activities and events at your local communities. Therefore, I would like to take the initiative from CAIMS 2019 Annual meeting, to call our members to join Activity Group of Math Education. If you are interested, please contact Hongmei Zhu at hmzhu@yorku.ca. We, as applied mathematicians, can empower Canadian children to create unlimited possibilities in the future because math is the foundation of STEM and the heart of all sciences!
Second Joint SIAM/CAIMS Annual Meeting

July 6-10, 2020

Sheraton Centre Toronto Hotel, Toronto

Themes:
- Scientific Computing
- Industrial Mathematics
- Mathematical Biology
- Financial Mathematics
- Fluid Dynamics
- Dynamical Systems

Keynote Speakers:
- Andrew Blumber, University of Texas at Austin
- Vincent Calvez, Université Claude Bernard Lyon 1
- Jose A. Carrilo, Imperial College London
- David Lannes, University of Bordeaux and CNRS
- Jianfeng Lu, Duke University
- Andrei Martinez-Finkelshtein, Baylor University
- Beverly J. McKeon, Caltech
- Maria Giovanna Mora, University of Pavia
- Barbara Niethammer, University of Bonn
- Lars Ruthotto, Emory University
- Arnd Scheel, University of Minnesota
- Ronnie Sicar, Princeton University
- Andrea Walther, Humboldt University
- Ulrike Meier Yang, LLNL

Homepage: https://www.siam.org/conferences/cm/conference/an20