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Workshop on Perspectives on Electronic Information & Communication in the Mathematical Sciences

The Mathematics & Physical Sciences division of the Simons Foundation hosted a Workshop in New York, September 12-13, concerning Perspectives on Electronic Information & Communication in the Mathematical Sciences, organized by the IMU Committee on Electronic Information and Communication (CEIC). Many aspects were discussed, including an important joint statement by IMU and ICIAM on the challenges of citation cartels and predatory publishers. Wil Schilders was invited as president of ICIAM, here is an account of his impressions.

Introduction

The Committee on Electronic Information and Communication (CEIC) is a standing committee of the International Mathematical Union (IMU), whose mandate is to review the development of electronic information, communication, publication, instruction, and archiving in the Mathematical Sciences and to represent the IMU accordingly at an international level. It serves the mathematical community as a whole by providing advice, endorsing standards, articulating best practice recommendations, and by the development of electronic infrastructure. Ilka Agricola of the Philipps-Universität Marburg in Germany is the chair of the CEIC, she was the main organizer of the workshop which brought together leading mathematicians, researchers, librarians and professionals who are interested in an interdisciplinary exchange of ideas that aligns with the CEIC's goals. Topics covered included:

1. The future of mathematical archiving and research data infrastructure
2. Steps towards a Global Digital Math Library

3. The challenges of citation cartels and predatory publishers
4. Open access and copyright strategies
5. New challenges: what is the impact of AI and formal proof assistants on mathematical publishing?

The meeting surveyed progress in these fields with an alternation of short presentations and discussion sessions. The third topic was especially of interest to us, as early in 2024 ICIAM and IMU started to discuss a joint statement as a reaction to the decision of the organization Clarivate in November 2023 to ban all mathematicians in their list of highly cited researchers. We used the workshop to further discuss this joint statement. More on this below.

The workshop was held in the premises of the Simons Foundation on 5th Avenue, New York, a splendid location. At 160 5th



Avenue, there is the main meeting area for workshops, very well equipped, modern, and the catering was really fantastic, starting with a luxurious breakfast each morning. Visitors are very well treated! On the other side of the street, 162 5th Avenue, the Flatiron building, is the building where many employees are working. Every two floors have their own theme: 3rd and 4th floor host the CCM (Centre for Computational Mathematics), other floors then host also topic areas starting with CC: Centre for Computational Quantum, Centre for Computational Biology, etc. Again, everything looks very modern, and I am sure that the people working here feel very comfortable. For more information, see for example the website of CCM [1]. The Simons Foundation also provides funding [2].

The future of mathematical archiving and research data infrastructure

As more and more journals are becoming digital – with several being exclusively available in digital format – it is increasingly important to establish viable means for ensuring free access to back issues of mathematical journals. For the mathematics community, it would be optimal to have the shortest possible window before open access. On the other hand, a short window would put financial pressure on learned societies and make it difficult to reach a broad agreement. The IMU Executive Committee (EC) – on the advice of the IMU CEIC

– created in 2021 an ad hoc Committee on Permissions with the task of preparing a report regarding the following:

- A recommendation for IMU policy on the time frame for making papers freely available after publication, together with technical details such as licenses.
- A concrete proposal for how to implement this recommendation, for example by outreach to publishers, with the particular goal of negotiating access to existing back issues.
- Any additional considerations that may affect the availability of past papers, such as the demise of publishing companies or issues with archiving.

The Committee on Permissions met from 2021 to 2024 and submitted its final report to the IMU EC in August 2024. This final report has been endorsed by the IMU EC. The report can be found at [3]. The main recommendation is that all mathematical journals should make their articles freely available within five years of publication. The discussion then concentrated on the question: What next steps can we take towards a GDML based on the report, and how to organise / fund it? Should the IMU formulate „best practice recommendations for authors“? For example, allowing the deposit of Author Accepted Manuscripts on personal websites and in public repositories with limited embargo periods. There was also much discussion on how to publish: Green Open Access, Gold Open Access, Diamond Open Access. The majority was in favour of Diamond Open Access, and this is interesting in the context of a contest that has been launched recently by the committee on Publications within PWN (and the organisation “Mathematics in Open Access”)[4]. It also turned out during the discussion that the Simons Foundation has provided 5 million US\$ to modernize the software of ArXiv; a representative of the latter organisation was also present at the meeting.

Steps towards a Global Digital Math Library

This topic was introduced by Marie Faräge (CNRS-INSMI and ENS Paris), who is leading a working group that will look for a universal legal framework which would be better suited to electronic publishing, and able to protect the interests of both researchers and of the academic institutions that

support them, not forgetting the taxpayers (citizens and companies) who fund public research independently of their original country. The working group will also propose that the exclusive transfer of copyright to the publisher should become non-exclusive, to take into account the contractual asymmetry between publishers and researchers (publishers require authors to submit their articles electronically in camera-ready layout and, when they are accepted after peer-review, to transfer their copyrights to them for free). The working group will look for a way to provide legal advice to researchers before they sign the contracts required by publishers, and to defend themselves if a publisher refuses to publish their article accepted by the editors. We will also examine the licenses currently used to publish research articles, analyse the recommendations published in 2024 by the IMU Committee on Permissions (see above), and consider advice that could be given to mathematicians wishing to publish in open access.

The challenges of citation cartels and predatory publishers

This topic was of the most interest to us, as ICIAM and IMU have been working together since the start of 2024 on a joint statement as a reaction to Clarivate’s decision to ban all mathematicians from their list of highly cited researchers. Clarivate is a global company that provides data-driven insights and analytics for businesses and researchers. It specializes in intellectual property, scientific research, and innovation, offering tools like Web of Science, Cortellis, and Derwent for patent research, drug development, and academic performance tracking. These tools help universities, researchers, and funding agencies evaluate research productivity, collaboration networks, and the influence of academic work globally. Clarivate’s annual Highly Cited Researchers (HCR) list identifies scientists and social scientists who have demonstrated significant influence in their fields through the publication of multiple highly cited papers. These researchers are recognized for being in the top 1% of citations for their respective subjects, based on data from the Web of Science.

In a Science paper [5] published January 2024, entitled “Citation cartels help some mathematicians—and their universities—climb the rankings”, Michele Ca-

tanzaro states that widespread citation manipulation has led the entire field of math to be excluded from an influential list of top researchers (namely Clarivate’s HCR list). Quoting from the paper: “Cliques of mathematicians at institutions in China, Saudi Arabia, and elsewhere have been artificially boosting their colleagues’ citation counts by churning out low-quality papers that repeatedly reference their work, according to an unpublished analysis seen by Science. As a result, their universities—some of which do not appear to have math departments—now produce a greater number of highly cited math papers each year than schools with a strong track record in the field, such as Stanford and Princeton universities.”

The paper in Science led IMU and ICIAM to start writing a joint document, arguing that current practices, such as citation counts and impact factors, are unsuitable for assessing the quality of mathematical work due to the discipline’s unique publishing culture. Mathematicians tend to publish fewer papers and receive fewer citations compared to other scientific fields, making them vulnerable to bibliometric manipulation. The document discusses broader issues of fraudulent publishing, including citation cartels, paper mills, and predatory journals, which distort the academic landscape across disciplines. It advocates for the mathematical community to take control of how its research is evaluated and proposes guidelines to mitigate malicious behaviours. Finally, the statement offers practical recommendations for recognizing and combatting fraudulent publishing practices in mathematics.

As an example, see Table 1 where we list the affiliations of the 89 mathematicians that appeared in Clarivate’s HCR list in 2019. Stunning fact is that the top university in this list has no mathematics department. The list also reveals problems

University Comments	# of HCRs
China Medical University Taiwan, Taiwan	11
King Abdulaziz University, Saudi Arabia	5
Queensland University of Technology (QUT)	3
Stanford University	3
University of California Los Angeles, US	3
Shandong Univ. of Science and Technology, China	2
Beijing Normal University, China	2
University of Minnesota – Twin Cities	2
University of Milano-Bicocca, Italy	2
University of Urbino, Italy	2
Amirkabir University of Technology, Iran	2
University of Michigan, US	2
University of Electronic Science and Technology of China	2

Table 1: Most frequent primary affiliations of the 89 HCRs in math (2019).

with affiliations, several of the universities listed have mathematicians on board that have many different affiliations.

Interesting is also the website [6] of retracted papers in journals. Restricted to mathematics, we observed that quite a few retracted papers can be traced back to mathematicians that were listed in the Clarivate 2019 list of HCRs. Furthermore, the database reveals that several publishers have high numbers of retracted papers in mathematics, with certain journals topping the list. Reassuring is that SIAM, which has many journals in applied mathematics, does not have any papers listed, probably due to the fact that they have excellent editorial boards.

Topics 4 and 5

The last two topics discussed, Open access and copyright strategies and New challenges: what is the impact of AI and formal proof assistants on mathematical publishing, were interesting in itself, but led to less discussion. Topic 4 concentrated on recommendations how to recognise and how to deal with the phenomenon, as author, editor, reviewer, evaluator, dean... Topic 5 was aiming at questions like: How will AI and computer proof assistants change mathematical publishing? What will be an "original" article? What can we do to fight AI generated fake science? Will AI be able to generate mathematical proofs in a few years? Some think this will be the case

in some 5 years.

Conclusion

The workshop was very interesting, and it is good to see that the IMU is very active in the field of publication, electronic information and communication, representing the interests of mathematicians. ICIAM is also getting involved with respect to the problem of misuse and fraud with respect to bibliometrics, as a business is developing that makes use of the vulnerability of mathematics in this respect. The joint IMU-ICIAM statement will be available at the end of 2024, and we will pay attention to this in the newsletter of Platform Wiskunde Nederland as soon as it has appeared.



Types of Open Access

- Diamond Open Access: Journals that do not charge fees for authors or readers. These community-driven initiatives support academic publishing without commercial interests and cater to diverse scholarly communities. Diamond journals are typically multilingual and operate on a small scale.
- Gold Open Access: Journals offering immediate Open Access to published articles. Various business models exist, some charging article processing fees (APCs) to authors. A directory of peer-reviewed Open Access journals is available via the Directory of Open Access Journals (DOAJ).
- Green Open Access: Also known as self-archiving. Authors can publish in any journal and deposit a version of the article (often the post-print) in an Open Access repository. Some publishers enforce an embargo period before public release.

Notes

- 1 <https://www.simonsfoundation.org/flatiron/center-for-computational-mathematics/>
- 2 <https://www.simonsfoundation.org/funding-opportunities/>
- 3 https://www.mathunion.org/fileadmin/IMU/Report/2024-IMU_Committee_on_Permissions-FinalReport.pdf
- 4 <https://www.mathoa.org/diamond-open-access-stimulus-fund/>
- 5 <https://www.science.org/content/article/citation-cartels-help-some-mathematicians-and-their-universities-climb-rankings>
- 6 <http://retractiondatabase.org/>