

Editorial To The Seventh Issue

Dear Reader,

Welcome to the seventh issue of the CWM newsletter. The CWM newsletter is usually released in the first days of May and November, but this edition comes slightly late, as we have been working hard to adapt and reshape the (WM)²- World Meeting for Women in Mathematics - after the devastating events that have been taking place since February 2022, and the consequent cancelation of the face to face ICM 2022. Our hearts and compassion are with the Ukrainian people.

The newsletter starts by detailing the program of (WM)², which now takes place virtually on July 1-2 2022. On July 1, a virtual session will take place with four plenary lectures, by Mina Aganagic, Eugenia Malinnikova, Natalia Maslova and Maryna Viazovska, followed by a panel discussion "Girls and Mathematics: reflections and initiatives". We dedicate this panel to the memory of Yulia Zdanovska, silver medalist at the 2017 European Girls' Mathematical Olympiad, who died on March 3, a victim of Russia's war in Ukraine. On July 2, the Olga Alexandrovna Ladyzhenskaya (OAL) Celebration takes place, co-organized by (WM)² and the Probability and Mathematical Physics 2022 ICM satellite conference. The OAL Celebration will be broadcasted live from Helsinki, starting with the premiere of a film about OAL and her influence, followed by the awarding of the inaugural OAL Prize.

We include our regular "News From CWM" and "Other News" sections and also continue our interview series with another CWM member, Ekin Ozman. Ekin is in charge of CWM Newsletter and also an active member of Women in Numbers (WiN), a scientific community inspired by the WiN workshops occurring regularly since 2008.

The invited paper in this Newsletter is a beautiful essay of Panagiota Daskalopoulos describing the great influence of Olga Alexandrovna Ladyzhenskaya on the developments in Partial Differential Equations and Mathematical Physics in the 20th century. « It was her spirit, deep and broad intellect, kind supportive character and courage which made her the distinguished woman mathematician she was, and an inspiration for all of us. »

In these difficult times of war and chaos, let us concentrate on scientific achievements, courage and kindness.

Marie-Francoise Roy and Carolina Araujo, chair and vice-chair of CWM

World Meeting for Women in Mathematics 2022

After evaluating the positive outcomes of the first (WM)² in 2018, CWM decided to make it a regular one day satellite activity of the ICM, taking place on the day preceding the ICM, preferably in the same venue. A permanent [website](#) has been designed for future (WM)² editions, while the website of (WM)² 2018 has been integrated to this permanent website.

With the recent tragic developments, and IMU's decisions about the ICM 2022 (see [here](#) and [here](#)), the second edition of the World Meeting for Women in Mathematics - (WM)² has become a mostly virtual event



WORLD MEETING
FOR WOMEN
IN MATHEMATICS

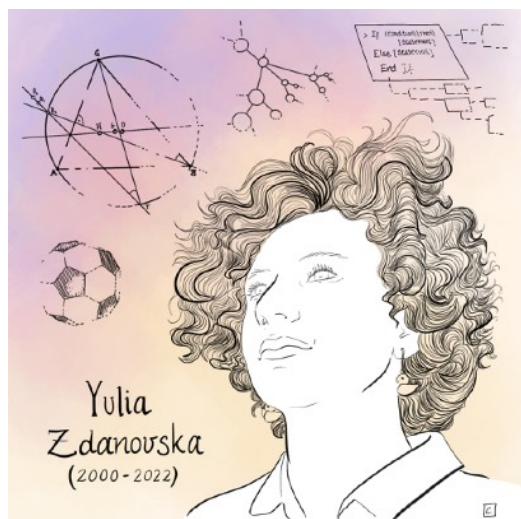


Illustration by Constanza Rojas-Molina

taking place on July 1-2 2022, with a special joint session with the Probability and Mathematical Physics ICM satellite event, on July 2nd 2022 in Helsinki. The date changed to accommodate the Ceremony for the IMU Prizes (Fields Medal, Abacus Medal, Carl Friedrich Gauss Prize, Chern Medal Award and Leelavati Prize) on July 5, 2022.

The program features on July 1, a virtual session with four plenary lectures by distinguished female mathematicians from the region where (WM)² 2022 was originally planned to take place. The lecturers are Mina Aganagic, Eugenia Malinnikova, Natalia Vladimirovna Maslova and Maryna Sergiivna Viazovska. More information about them can be found [here](#). This is

followed by a panel discussion Girls and Mathematics: reflections and initiatives, dedicated to the memory of Yulia Zdanovska. The program on July 2 is Olga Alexandrovna Ladyzhenskaya (OAL) celebration, a joint session organized with the Probability and Mathematical Physics conference (see more next page).

For the program and registration (which is free!) of the meeting please visit [here](#).

Olga Alexandrovna Ladyzhenskaya Celebration

The year 2022 marks the 100th birthday of [Olga Alexandrovna Ladyzhenskaya](#). To celebrate this event and honor her, the Ladyzhenskaya Prize in Mathematical Physics ([OAL Prize](#)) was established. It will be awarded, in its inaugural edition, during the [Olga Alexandrovna Ladyzhenskaya \(OAL\) celebration](#), a joint session organized by [\(WM\)² 2022](#), the World Meeting for Women in Mathematics and the [Probability and Mathematical Physics ICM satellite](#)

[event](#). The OAL celebration takes place on July 2 2022 from 10 am to 12- on July 2, in Helsinki. The session starts with the premiere of a film about OAL and her influence and continues with the awarding the OAL Prize: presentation of the Prize by Ingrid Daubechies, announcement of the Prize Winner, Laudatio and Prize Winner Lecture. The Laudatio and Prize Winner Lecture are taking place live and are also broadcasted as part of the virtual (WM)².



Best Practices Towards a More Diverse and Inclusive Mathematical Community

A joint panel namely "Best Practices Towards a More Diverse and Inclusive Mathematical Community" is organized by the IMU Committee for Women in Mathematics (CWM) and the IMU Committee on Diversity (CoD) during the virtual ICM 2022. It will be broadcasted on Friday July 8, 14:15-16:15 (CET). The moderators are Motoko Kotani (CWM), Edray Goins (CoD). The panelists and the titles of the presentations are as follows:

- Carolina Araujo(CWM) The role of organizations for women in mathematics
- Edy Tri Baskoro(CoD), TBA
- Nira Chamberlain, The Black Heroes of Mathematics – Do I look like a Boxer?
- Anjum Hala(CoD), Language, learning and mathematics: Diversity and inclusion
- Ekin Ozman(CWM), Research Collaboration Conferences for Women, WIN Example
- Marie-Françoise Roy(CWM), The Gender Gap in Mathematics

More information can be found [here](#).

Interview with Ekin Ozman

We continue our interview series with [Ekin Ozman](#), member of CWM. Prof. Ozman is working at the Mathematical Department of Bogazici University, Istanbul, Turkey. Her research area is number theory, arithmetic geometry. She got her PhD from the University of Wisconsin-Madison. After spending a year as a European Postdoctoral Institutes(EPDI) Laureate she worked at the University of Texas at Austin. In 2014 she returned to her home country and joined Bogazici University.

Ekin has been a member of CWM since 2019 and her main responsibility is the preparation of CWM newsletters. For this issue, the interview and editorial is done by Marie-Francoise Roy and Carolina Araujo.

Q:Please introduce yourself and tell us about your career and current situation.

EO : I am a faculty member in the mathematics department at Bogazici University, Istanbul. I was born and lived in Turkey until I started my PhD. For my PhD, I moved to the USA and got my degree from the University of Wisconsin-Madison under the supervision of Jordan Ellenberg. After my PhD, I worked at IHES-France, MPIM-Germany and the University of Texas at Austin. Finally, in 2014 I returned to Turkey and started working at Bogazici University.

Q: Could you tell us how you got into math? What made you a mathematician? When did you decide to become a mathematician?

EO: I wasn't one of those people who were interested in mathematics since their childhood. In fact, I didn't like mathematics much during primary school. I rather enjoyed reading a lot and dreamed about being a journalist when I grew up. It was later, during middle and high school, I had great math teachers who made me fall in love with the subject. I especially remember one teacher during my high school years who taught me the knots and bolts of proofs. Because of him, I started to think about studying mathematics in college. I started to read popular math books, there were not so many available back then in Turkey. But I think I read all of the ones that were published by the Turkish National Science Council. They were so precious to me that I used to cover them with a special paper so they wouldn't get damaged. I still keep the copies I had back then.

Q: Did you have any role models, male or female?

EO: I think each mathematician that I have met effected me in one way or another. It would be hard to name someone specific since so many people had influence on me. I was lucky to have great mentors during college and graduate school. I think one

important thing that I learned from them is that there is life outside mathematics too. They were role models not only by being great academicians but also by being great colleagues, friends and parents.

Q: Can you tell us about your research? What attracted you to this area of mathematics?

EO: I do number theory. To be more specific, I work on algebraic curves and related subjects such as solving Diophantine equations. I really enjoy the problems that I work on but I think, my attraction to the area was a bit by coincidence. I started college as a computer engineering major. In Turkey, to go to college you have to take a centralized exam and according to your score you are placed to a university. I always knew that I wanted to study math but because of the score I got, everybody around me thought I should choose an engineering department. Being 17, I couldn't resist much but at least I compared the curriculum of the engineering departments and decided that computer engineering had the most math courses in it. Then I decided to go to the computer engineering of Middle East Technical University since they were offering double major programs with the mathematics department. And that was a good decision! I started a double major with mathematics as planned and started taking the basic courses.

However, because of the schedule conflicts of the two departments, I took more algebra courses than analysis courses early on and this kind of determined my path. Later, I left computer engineering and transferred into mathematics and took as many math courses as I liked.

I really like the area that I work on. The problems are usually centuries old and have statements that are easy to understand but the proofs often require almost everything developed in the area. I try to pick problems that I enjoy working on, therefore it is hard to pick a favorite. But I can say that I really liked my PhD thesis problem. It is about existence of rational points on certain twists of modular curves. I still work on questions regarding rational or higher degree points on modular curves but being one



EPDI poster featuring a discussion with Dennis Sullivan and Ekin Ozman at IHES, France

of the first major problems that I solved, it has a special place for me. I am happy to see that it is still used by other researchers in the area.

Q: Can you tell us about your teaching and other aspects of your career as a mathematician? What are the aspects you enjoy the most?

EO: I enjoy teaching a lot. The students that we have at my university are my main source of motivation to go to work everyday. I enjoy research too of course but as we all know, doing research is not always a happy activity. Being in the classroom and seeing the excitement in the young eyes can freshen someone and give the energy to continue doing research too. At least, that is the case for me.

Q: You have been involved with “Women in Numbers” for many years. Can you tell us how this scheme works, and the benefits one gets from this type of experience.

EO: Women in Numbers is a mathematical community inspired by regularly occurring women in numbers (WIN) workshops. (The members of community are not only participants of previous WIN workshops.) The first of these workshops was in 2018, in Banff, Canada organized by Kristin Lauter, Rachel Pries and Renate Scheidler. In 2013, a European leg, Women in Numbers-Europe(WIN-E) was established. In 2022, the fourth European workshop is happening and next year the

sixth workshop in North America will take place. These workshops are quite different than regular conferences where the majority of the program is devoted to talks. In WIN-(E) workshops, the time is devoted to group work and discussions. These groups are formed months before the workshop, lead by senior mathematicians. The group leaders suggest a problem and background reading to the group members who are mostly advanced PhD students, postdocs or junior faculty. Everyone gets involved, is prepared and the group



Women in Numbers Europe-2, Lorentz Center, together with participants from Turkey

works on the problem during the workshop. Of course, the work usually is not completed within the duration of the workshop but people continue their

collaboration. Usually after 6-8 months after the workshop each group submits a paper to be published in the WIN-(E) proceedings. These proceedings are part of AWM-Springer series and each paper is refereed carefully. I think the format of the workshops is very helpful to get women involved in research, start collaborations and to build network. This successful format later used in other areas and several "Women in " workshops took place such as Women in Topology, Women in Algebraic Geometry, Women in Math Biology to name a few. The full list can be found [here](#).

Q: Do you have Ph D students ? How do you view the experience of being an advisor?

EO: I have currently one PhD student but I advised several MSc students in the past. Most of them decided to pursue their PhD studies abroad and moved outside Turkey. I try to work on problems that I enjoy personally, this way it is fun for me to think about them. This is what I try to advise my students too. I think one should enjoy to think about a problem in order to be able to solve it. This is necessary but of course, not sufficient. Every problem comes with challenges and there will be times that one won't feel so enthusiastic about the work. At those times, I think it is important to be able to keep working on systematically. I don't mean working very long hours. I think this is nor possible neither helpful. But spending some time regularly, every day is a must. After all, if we only work on our research when we "feel like it" then I think it rather becomes a "hobby".

Q: You have been a CWM member since 2019, and have been the editor of the CWM Newsletter since its inception. Can you describe the work involved and the difficulties/joys associated to this task?

EO: I really enjoy preparing CWM newsletter. And I must add that there is a great group of people helping me. I want to thank Marie-Francoise Roy, Carolina Araujo and Cheryl Praeger for their valuable contribution. I hope the readers enjoy reading it too. Not necessarily a difficulty but rather one of the most important parts may be recruiting an article which is written by someone who is usually not a CWM member. I must say that we were really lucky to have great authors who were writing amazing articles for us. It was not too difficult to find interesting articles so far. I hope this continues to be the case in the future. I would like to use this opportunity to ask all the readers especially the CWM ambassadors for their suggestions, what would they like to see in CWM newsletter?

Q: Have you faced any challenges as a woman in mathematics? Can you tell us about your family ? How do you balance family life and your mathematical career?

EO: I think the biggest difficulty for me was trying to balance family life and work after I had kids. I have two young kids, 7 and 2 years old. I would be lying if I say that it is easy to balance family and work, it is fun but it is also difficult. For instance, it was a lot easier for me to travel for conferences and meet with my collaborators in the past. My husband is also a mathematician, so he understands and supports a lot but still, with two young kids, I have to make tremendous amount of childcare

arrangements to be able to travel. Obviously this is a temporary situation. I always remind myself that things will be a lot easier in the future. I still remember how bad I felt when I had to turn down several conference invitations after my first child was born. I am happy to see that people started to acknowledge these issues and support for childcare started to be part of many organizations. I hope this will make it easier for women with young kids to travel for conferences.

Q: What are your hobbies?

EO: I really like reading and hiking. Both are great ways for me to concentrate and clear my mind. I love being connected to nature although it is not easy to do when you live in a big city. But nevertheless, I try to go for long walks in calmer places of the town whenever I can. I do not only read books for adults, I love reading picture books or books for teens too. I sometimes use my kids as an excuse for dealing with literature for youngsters but to be honest, I enjoy it myself and will probably read picture books even when they grow up.

Q: Please formulate it in your own words, unless you have a favorite citation to share with us.

EO: I believe that challenges are necessary to enjoy life. The joy of overcoming difficulties is like the joy of solving a mathematical problem.

Q: What changes have you noticed in yourself and those around you in these pandemic years? How do you envision the post-pandemic world?

EO: I was really scared in the beginning of the pandemic like everybody. Later, in addition to being scared, I started to feel being tired all the time. The amount of work that needed to be done at home increased exponentially. However, after a while, especially after the vaccinations I started to feel more secure and started to adjust to the new “normal”. I got used to attending online meetings. Although I prefer face to face meetings, I have to admit that online meetings made life easier in some aspects. For instance, people who are in geographically disadvantaged parts of the world or who have personal travel constraints can still be connected with others in some way, thanks to these online meetings. I think this “hybrid” model will continue to exist in the future.

You can read the old issues and subscribe

the

CWM newsletter [here](https://www.mathunion.org/cwm/about/cwm-newsletter).

<https://www.mathunion.org/cwm/about/cwm-newsletter>

NEWS FROM CWM

Condolences- Yulia Zdanovska

The International Mathematical Union Committee for Women in Mathematics (CWM) deeply regrets the death of 21-year-old Yulia Zdanovska, who was a silver medalist at the European Women's Mathematical Olympiads (EGMO) in 2017. Yulia was a brilliant young mathematician with a successful future ahead of her. The young woman refused to leave Ukraine amid the war and, working as a volunteer, died in a fire caused by a Russian missile that hit her residential area in the eastern city of Kharkiv. CWM expresses its sympathy with the family and the math community as a whole, united in mourning and honoring Yulia. In (WM)² 2022, a panel discussion "Girls and Mathematics: reflections and initiatives" will be dedicated to the memory of Yulia Zdanovska.



International Day of Women and Girls in Science on 11 February 2022: Activities around the world reported by the CWM Ambassadors

Since its establishment by the UN General Assembly on 22 December 2015, the International Day of Women and Girls in Science, taking place on February 11, aims at raising awareness on the issue celebrating women's excellence in science and reminding the international community that science and gender equality have to advance hand-in-hand to address major global challenges and achieve all the goals and targets of the 2030 Agenda.

Below you can find the initiatives reported by CWM ambassadors in 2022. In addition to these a virtual gathering of all the CWM ambassadors worldwide took place on February 11 2022 featuring a panel "Strengthening mathematical interaction between female mathematicians from all over the world" and presentations of summaries of activities of each continent.

- **Brazil**

Gathering about the SBM/SBMAC Gender and Diversity Committee

In this event, the goal is to present the history and current actions of the Gender and Diversity Committee from the Brazilian Mathematical Society and the Brazilian Applied and Computational Mathematical Society. Also, there will be a brief presentation of the members of this committee and the announcement of the second edition of the Brazilian Meeting of Women in Mathematics.

- **Colombia**

Launch of the Club de Mujeres que Aprenden Matemáticas

The Women Learning Mathematics Club will be officially launched as part of the celebration of the International Day of Girls and Women in Science. The Club is planned and developed at the Departmental Educational Institution Santa María de Ubaté, with the aim of providing spaces to continue promoting meaningful learning experiences that complement, broaden and deepen the processes and concepts addressed in the regular day and continue to motivate the participation of young girls in mathematics. More [here](#).

Live Podcast International Day of Women and Girls in Science

In this celebration we want to invite you to listen to outstanding women scientists from our institution and guests through a live podcast that allows us to make women scientists visible and motivate more girls and women to be interested in these areas.

- **Ecuador**

Posting of Flyers

From February 11, the Sociedad Ecuatoriana de Matemática (SEdeM) posted flyers regarding outstanding female mathematicians, statistics on the situation of Ecuadorian women in mathematics and more. More information [here](#).

- **France**

An interactive theater performance took place in Lyon on the Day of Women in Science. See more (in french) [here](#).

- **Mexico**

Rally de Matemáticas

On February 11, a virtual Rally held to commemorate the International Day of Women and Girls in Science. In addition to math talks aimed at girls and young women, a math rally was held with some math puzzles, questions about some female mathematicians and other curious facts to promote an approach to the discipline and to women who have participated in it.

- **Nepal**

Celebration of IDWGS 2078 (Nepal Calendar)

This is a virtual event organized by Women of Nepal in Mathematical Sciences

(WoNiMS). A floor discussion on Women and STEM in Nepal was held, followed by a talk on "Mathematical and Philosophical Aspects of Zero and One" by Prof. Shankar Raj Pant. More information [here](#).

- **Panama**

Launch of the FUNDAPROMAT Math Almanac 2022

In the FUNDAPROMAT Math Almanac in Spanish, you can find one math challenge every day of the first 3 months of the year 2022. In every month a woman is highlighted who has left a mark in the history of mathematics. The official launch of the entire FUNDAPROMAT Math Almanac 2022 took place on February 11th, 2022 to celebrate the International Day of Women and Girls in Science.

- **Romania**

Celebration of one year Monthly seminar "On Mathematics and Life"

First year anniversary of the monthly seminar "On Mathematics and Life" has been celebrated by launching a [website](#) of the group of Romanian Women in Mathematics.

- **Tunisia**

Portraits and Perspectives

The Tunisian Women Mathematicians Association, the Cultural Alternative Association, and the Tunisian Sustainable Technologies Association celebrate the International Day of Women and Girls in Science, on February 11th, 2022. The theme of this year is : « Portraits and Perspectives ». The celebration will take place at the Faculty of sciences of Monastir, Tunisia. It starts at 8h30 am local time and ends at 2h30 pm local time. The aim is to provide the participants with the opportunity of debating about the issue of employment of young science female researchers. The debate will be held in the honorable presence of: -Professor Faten Ben Abdallah, the Ex-Vice-Rector of the University of Monastir. - Professor Sana Salah, the current Vice-Rector of the University of Monastir. - Madame Abir Brahem, the head of the Center of Carrier and Skills Certification, University of Monastir. More information [here](#).

- **United Arab Emirates**

Femmes et mathématiques

Two seminars at the lycée français International Georges Pompidou Dubai for the event "Femmes et mathématiques " (women and mathematics) held by Lama Tarsissi on the 8th of February.

Result of CWM call 2022

The CWM called for proposals for initiatives to be held during 2022 to support women in mathematics. The CWM call received 31 applications of which CWM decided to

support 10. The website of the AOWM (Asian and Oceanian Women in Mathematics) platform and the update of the website of AWMA (African Women in Mathematics Association), as well as three regional meetings, the third Central Asian Women in Mathematics in Tajikistan, the second Women in Sage in Africa meeting in Nigeria and the Latin American and Caribbean Workshop on Mathematics and Gender in Oaxaca (Mexico) are selected. The other five supported events will take place in Gabon, Ghana, India, Oman and Brail (II Brazilian Meeting for Women in Mathematics).

Maryam's Museum in Taleghan

CWM approved the Maryam's Museum (in Taleghan) request to host Remember [Maryam Mirzakhani Exhibition](#) permanently. Maryam Mirzakhani's family and the Foundation of Maryam Mirzakhani - a charity organization supporting talented girls continuing their study, have prepared a place in her mother's hometown named Taleghan for a museum named Maryam's Museum. The Museum is intended to show some of Maryam's belongings.

МАТЕМАТИКА, through a land of mathematics

With the recent war in Ukraine and its tragic developments, the preparation of the CWM funded exhibition МАТЕМАТИКА, through a land of mathematic, has been paused. See the [announcement](#) by its authors.

The exhibition project [МАТЕМАТИКА, through a land of mathematics](#) aimed at highlighting ten interviews with women in mathematics across Russia. The heroines identified by МАТЕМАТИКА are researchers, administrators, teachers, some of them involved in the mathematical olympiad movement.

The goal of this project was to sketch, through a series of personal stories, a portrait of modern Russian mathematics. This project was prepared especially for the (WM)², and the exhibition was planned to be inaugurated at the meeting. A companion book containing full versions of the interviews as well as photographic impressions of Russian cities, was also in preparation.

OTHER NEWS AND ANNOUNCEMENTS

- [Georgia Benkart passed away](#)

[Georgia Benkart](#) (December 30, 1947 – April 29, 2022) emeritus professor at University of Wisconsin-Madison was known for her work in the structure and

representation theory of Lie algebras and related algebraic structures. A tribute to her contributions to her field, "[Gems from the Work of Georgia Benkart](#)", appeared in the Notices of the American Mathematical Society. She was elected and served as president of the Association for Women in Mathematics from 2009 to 2011. In 2014 at the International Congress of Mathematicians held in Seoul, she delivered the ICM Emmy Noether Lecture. Georgia Benkart collaborated with CWM in several occasions. In particular, she was the chair of the (WM)² 2018 program committee, and one of the editors of its Proceedings. We will miss her. Please see [here](#) for a collection of Georgia Benkart Remembrances.

- [May 12, a Celebration for Women in Mathematics, year 2022](#)

May 12 was chosen for the Celebration of Women in Mathematics because it is the birthdate of Maryam Mirzakhani. The initiative was proposed by the Women's Committee of the Iranian Mathematical Society and voted by a vast majority of attendees to (WM)², the World Meeting for Women on Mathematics on last July 31 in Rio. Several suggestions for local activities around May 12 are listed [here](#). May12 Initiative recommends free screening of the award-winning film "[Women in science in Africa, A SILENT REVOLUTION](#)" available (in english or in french) online [here](#). Please feel free to organize one and declare it on May 12 website.

The initiative is supported by several organizations for women in mathematics worldwide (European Women in Mathematics, Association for Women in Mathematics, African Women in Mathematics Association, Indian Women and Mathematics, CGD-UMALCA (Comisión de Género y Diversidad de Unión Matemática de América Latina y el Caribe) and the Women's Committee of the Iranian Mathematical Society). More information can be found [here](#).

- [Launching SCGES webinar](#)

The Standing Committee for Gender Equality in Science (SCGES) launched its Webinar Series. The aim is to create exchanges and interactions related to issues around Gender Equality in Science among various scientific communities. The first session took place on February 16th, 2022, at 4 pm to 6 pm CET. It is organized by IMU and ICIAM, on the topic of Gender Equality in Mathematics. See more [here](#).

- [Data base of good practices to reduce the gender gap now available](#)

The [Gender Gap in Science Project](#) collates a sample of these initiatives using an online database so that users are able to access information about a variety of initiatives that aim to address the gender gap in Science and Mathematics.

The Data base of good practices to reduce the gender gap can be consulted [here](#). Relevant initiatives can be submitted [here](#).

- **Fifty Years of Women in Mathematics**

The book [Fifty Year of Women in Mathematics, Reminiscences, History, and Visions for the future of AWM](#) edited by Janet L. Beery, Sarah J. Greenwald and Cathy Kessel is published. This book celebrates fifty years of the oldest association for women in mathematics in the world and features contributions from a large and varied array of people in mathematics. It also provides a historical chronology and reminiscences of AWM from its inception through present day. The book is published as part of the [Association for Women in Mathematics Series book series](#) (AWMS, volume 28). The article International Initiatives for Women Mathematicians by Marie-Françoise Roy and Caroline Series contained in the volume is describing the creation and initiatives of CWM.

- **Women in Science film festival organized by OWSD**

The online Women in Science Film Festival is organized by OWSD in partnership with the International Science Council (ISC) on the occasion of the International Day of Women and Girls in Science, this Friday, February 11.

The festival celebrates the stories and contributions of women in science in developing countries and around the world, with 10 new short films featuring women scientists:

- 6 films made as part of the second round of the OWSD Visions project, in which OWSD video consultant Nicole Leghissa works with local filmmakers in developing countries to help them tell the story of women scientists in their communities. The new films premiering as part of this festival feature 6 OWSD members in Benin, Bolivia, the Republic of Congo, Ecuador, Kenya, and Nepal, who are engaged in research ranging from using magnetic refrigeration to help preserve food security, to turning citrus fruit waste into sustainable cosmetics.
- 4 films produced as part of the International Science Council's Unlocking Science series by BBC Storyworks. These include one film made for OWSD featuring Early Career fellow Elizabeth Bandason, and three others on Battling bias in AI, The female future of science in Africa, and Women in STEAM.

All of the films are available to view on the Film Festival [webpage](#). In addition, on February 11 there was a panel discussion on Case Studies: Approaches to Storytelling

in Science, from 15:00-16:15 CET. OWSD Coordinator Tonya Blowers moderated a panel of communications and storytelling experts involved with both projects:

Megan Lloyd-Laney – Director, CommsConsult

Nick Ishmael-Perkins – Senior consultant, Public Value of Science program

Nicole Leghissa – Filmmaker, Coordinator OWSD Visions project

Sudin Bajracharya – Filmmaker, Founder, Kathacharya Productions

- [Words of Women in Mathematics in the Time of Corona final version](#)

The film "Words of Women in Mathematics in the Time of Corona final version" on the website can be accessed [here](#). Film and website are now ready to be shared, disseminated and expanded. The website contains an "Events" page with a list of past and upcoming events, film screenings and exhibitions. The film is selected as part of the UNESCO Exhibition "Creative Resilience: Art by Women in Science". The exhibition, that also exists as a virtual museum, contains an amazing collection of art by women scientists.

- [Matilde Lalín to Receive the 2022 Krieger-Nelson Prize](#)

The Canadian Mathematical Society (CMS) announced Dr. Matilde Lalín (Université de Montréal) as the recipient of the 2022 Krieger-Nelson Prize for her outstanding contributions to research in Number Theory and related areas. More [here](#).

- [TWMA best thesis Awards 2021](#)

Tunisian Women Mathematicians' Association (TWMA) best thesis Awards for Tunisian women in pure mathematics and in applied mathematics were given respectively to Dr Sabrine Chebbi from Tunis El Manar University and to Dr Nahed Naceur from Sousse University/Lorraine University. For this edition, the president of the jury for the best thesis in pure mathematics was Professor Hajer Bahouri (University Paris-Est-Créteil-Val-de-Marne) and the president of the jury for the best thesis in applied mathematics was Professor Nahla Abdellatif (Tunis El Manar University). The Award ceremony was organized by the TWMA at the Faculty of Sciences of Tunis on Wednesday, December 15, 2021.

- [ICM 2022 Emmy Noether Lecturer: Marie-France Vignéras](#)

ICM Emmy Noether Lecture honors women who have made fundamental and sustained contributions to the mathematical sciences, it was presented for the first

time in 1994. The 2022 ICM Emmy Noether Lecture will be delivered by Marie-France Vignéras, Professor Emeritus of the Institut de Mathématiques de Jussieu, Paris, France. More information on the announcement of the Emmy Noether Lecture [here](#).

- **Indian woman in mathematics Neena Gupta receives the 2021 Ramanujan Prize**

Professor Neena Gupta received the Prize for her outstanding work in affine algebraic geometry and commutative algebra, in particular for her solution of the Zariski cancellation problem for affine spaces. She is the third woman to receive the Ramanujan Prize, which was first awarded in 2005 and is administered by ICTP jointly with the Department of Science and Technology (DST, Government of India), and the International Mathematical Union (IMU). The Prize is awarded annually to a researcher from a developing country who is less than 45 years of age on 31 December of the year of the award, and who has conducted outstanding research in a developing country. More information on the Mathematics Prize announcement [here](#).

- **Prix Jeune Chercheur de l'Académie Tunisienne des sciences, des lettres et des arts "Beit al-Hikma" to Selma Negzaoui**

Selma Negzaoui, TWMA chair, AXMA member and CWM ambassador in Tunisia, receives the young researcher prize from the Tunisian Academy of Sciences, Humanities and Arts "Beit Elhikma" for the year 2021 for her work in harmonic analysis. See [here](#).



The work of Olga Ladyzhenskaya

Article written by Panagiota Daskalopoulos

As a high-school student in Greece with a passion for mathematics I was fascinated by the life and achievements of the Russian mathematician Sofia Kovalevskaya. My fascination was not limited to her deep contributions in analysis and partial differential equations, but included her inspiring life, which showed her continuous courage in overcoming all obstacles in order to pursue what she loved: mathematics.

It was a few years later, during my graduate school days at the University of



Chicago, that I became aware of another great

Russian female mathematician of remarkable intellect and courage: Olga Aleksandrovna

Ladyzhenskaya, one of the leading figures in the development of Partial Differential Equations in the 20th century. I was given a thesis problem related to

quasilinear parabolic equations and needed to study Olga Ladyzhenskaya's monograph, written with her students Nina Ural'tseva and Vsevolod Solonnikov, on linear and quasilinear equations of parabolic type.

This monograph of more than 700 pages, published in Russian in 1967, contains important, mostly original work by the authors on the solvability and regularity of parabolic quasilinear equations of second order.

Previous fundamental works by Olga Ladyzhenskaya with Nina Ural'tseva on elliptic quasilinear equations

of second order were the subject of an earlier monograph, published in Russian in 1964. Both monographs were later translated into English by the American Mathematical Society. Many of us have learned a lot from her two great books, which were the best source on elliptic and parabolic partial differential equations available before the more recent books of Gilbarg-Trudinger and Lieberman. Many of the results in these two monographs are still very relevant today.

Olga Ladyzhenskaya started working on second order elliptic boundary-value problems shortly after her thesis which she defended in 1949 and was supervised by the famous analyst Sergei Lvovich Sobolev. In 1951, shortly after her thesis, she proved one of the most fundamental inequalities for second order elliptic operators \mathcal{L} with smooth coefficients, which states that any function $u \in W^{2,2}(\Omega)$ satisfying one of the homogeneous classical conditions on the boundary of the smooth domain Ω satisfies the inequality

$$\|u\|_{W^{2,2}(\Omega)} \leq C(\Omega) \left(\|\mathcal{L}u\|_{L^2(\Omega)} + \|u\|_{L^2(\Omega)} \right).$$

This inequality has had a tremendous impact in the development of second-order PDE and it is now contained in any graduate text on the subject.

The 1950's was an exciting time for the development of elliptic PDE's. Following S. N. Bernstein's approach based on a priori estimates for solutions, the fundamental works by Leray and Schauder had reduced the classical solvability of the Dirichlet problem to obtaining a priori estimates of the solutions in $C^{1,\alpha}$ norm. However, up to the mid-1950s most of the important results were in two-dimensions and often under rather restrictive conditions. It was around that time that the works by E. de Giorgi and by J. Nash on Hölder regularity of solutions to linear parabolic and elliptic equations in divergence form with bounded measurable coefficients came out. These results, were to change the field forever and Ladyzhenskaya played a leading role in this transformation. In a number of important works with her students N. Uraltseva and later with V. Solonnikov in the parabolic setting, she contributed many deep results in the study of boundary-value problems for quasilinear elliptic and parabolic equations. They developed a complete theory for the solvability and regularity of boundary-value problems for elliptic and parabolic equations in divergence form, greatly extending the techniques of De Giorgi, Nash and Moser. These results which were included in her two monographs mentioned above, remained at the forefront of the field for many years. It was only much later, in the early, 1980's when the Krylov-Safonov celebrated Hölder regularity result for solutions of elliptic and parabolic equations in non-divergence form, led to an equally complete theory for equations in non-divergence form, and opened new exciting directions in the development of fully-nonlinear PDE's.



In the mid 1950's Olga Ladyzhenskaya started working in fluid mechanics. She became interested in the Navier-Stokes equations, a system of equations which is known for its intriguing complexity despite its very simple form. Only a few years after Olga Ladyzhenskaya entered the field she established a breakthrough: her 1959 result on the global unique solvability of the initial boundary value problem for the 2D Navier-Stokes equations in **domains with boundary**. She continued making important contributions in this area during the rest of her career.

J. Leray, in his seminal work from 1934, established the global unique solvability for the Cauchy problem for the Navier-Stokes equations in dimensions

two. However, for more than 20 years after Leray's work, the global unique solvability of the 2D Navier-Stokes equations on domains with boundary has been an open question. In domains without boundary, to which Leray's methods apply, one has in dimension two an a-priori bound for the vorticity, which makes the equation **sub-critical**, in today's terminology. This bound does not work well near the boundary, and one can work only with the energy estimate, for which the equation is **critical** in dimension two. In today's terminology, the Navier Stokes equation is critical when considered in domains with boundaries. It was pointed out to the author that Ladyzhenskaya's work proving regularity of the solution in this situation was one of the first one where a PDE with a critical nonlinearity was successfully handled.¹ To solve the problem, Olga Ladyzhenskaya established another fundamental inequality which now carries her name, namely that for any $u \in C_0^\infty(\mathbb{R}^2)$, one has

$$\|u\|_{L^4(\mathbb{R}^2)} \leq C \|u\|_{L^2(\mathbb{R}^2)} \|\nabla u\|_{L^2(\mathbb{R}^2)}$$

where C is a universal constant. Inequalities of the above type are often referred to

as multiplicative inequalities and have been extensively used since then. These and other of her first important results on the Navier-Stokes equations are included in her seminal monograph titled "**Mathematical Theory of Viscous Incompressible Flows**", which still remains one of the most influential books in the field.



For the three-dimensional system of equations, the global unique solvability of the Navier-Stokes equations is still an open question and one of the Clay Foundation Millennium problems. Despite the continuous effort of many great mathematicians, there is still much to be understood about this complex problem. Since very early on, there has been a continuous debate as to whether the initial value problem in three dimensions admits a smooth solution for all time, and, if not, whether a generalized solution is uniquely determined by the initial data. Olga

Ladyzhenskaya stayed at the forefront of this discussion contributing a continuous flow of ideas. She seemed to believe that the class of Leray-Hopf solutions of the Navier-Stokes equations is too weak that one cannot expect that uniqueness holds in this class. As a result, she proposed a model of "**modified Navier-Stokes equations**" and she proved unique global solvability for this system. Her model, which only differs from the original model in regions where the velocity fluctuates rapidly, was

¹ The author thanks Vladimir Sverak for this comment.

presented at the International Congress of Mathematicians in Moscow in 1966. It is now called the "**Ladyzhenskaya model**" and it is widely studied. In a work published in 1969, Olga Ladyzhenskaya constructs an example of non-uniqueness of weak Hopf solutions in a non-standard time-dependent domain. In this work she writes: "As regards the class of weak Hopf solutions for the general three-dimensional case, it has always seemed to me that it is too broad, i.e., that there is missing in it a basic property of the initial-value problem, viz. its determinacy (a uniqueness theorem) But I had available only indirect reasons in support of this assertion which had no formal demonstrative power. At this time I am able to rigorously prove the validity of my opinions."

Some of the late results by Ladyzhenskaya concern attractors to 2D Navier-Stokes and the 3D modified Navier-Stokes equations, as well as to quasilinear parabolic systems. In these works she developed new techniques which are now widely used in many other situations.

There is so much more that could be said about the mathematics of Olga Ladyzhenskaya and about her great influence on the developments in Partial Differential Equations and Mathematical Physics in the 20th century. Besides her own research, her constant flow of ideas, support and encouragement towards her students and other members of her school in St. Petersburg, had a tremendous influence on mathematics in the Soviet Union. In one of her last public lectures, at a conference held in Madeira in June 2003, Olga Ladyzhenskaya gave a spirited philosophical view on her ideas on Navier-Stokes equations. It was her spirit, deep and broad intellect, kind supportive character and courage which made her the distinguished woman mathematician she was, and an inspiration for all of us.

There has recently been a lot of discussion among mathematicians in academia as to how to increase the influence of women in mathematics. Olga Ladyzhenskaya represents a role model for both the current and the future generations of women in mathematics: deep important work, courage and a kind, supportive spirit.



About the Author:

Professor Daskalopoulos is a faculty member in the Department of Mathematics at Columbia University. Her primary research area is Partial Differential Equations and Differential Geometry. She got her PhD from the University of Chicago in 1992.

She has numerous awards and honors including a Guggenheim Fellowship (2005-2006) and Sloan Fellowship (1998-2002). She was an invited speaker at the ICM in 2014 and a member of the Scientific Advisory Committee of the Mathematical Sciences Research Institute in Berkeley, California between 2013-2017.