

# **Report of the AWMA Regional Workshop, Women in Mathematics for Information security in Africa AIMS-CAMEROON, LIMBE 13<sup>th</sup> to 14<sup>th</sup> JULY 2019**

## Background Information

The African Women in Mathematics Association (AWMA) and the Cameroon Women in Mathematics Association (CAWOMA) organised the AWMA Regional Workshop, Women in Mathematics for Information Security in Africa, held during the period 13th-14th July 2019 at the African Institute of Mathematical Sciences (AIMS), Limbe, Cameroon.

This workshop follows a series of workshops, the first one was held at the University of Ouagadougou (Burkina Faso), 26th – 27th October 2012, the second one was held at the African Institute of Mathematical Sciences (AIMS), Cape Town, (South Africa), 17th – 19th of July 2013, the third one was held in Naivasha, Kenya, 16th – 18th of July 2015 and the fourth one at the International university of Rabat (IUR), Morocco, 6th-7th July 2017 as a satellite conference of the 9th Pan African Congress of Mathematicians (PACOM 2017).

This workshop hold in the fringe of a CIMPA research school on *Algebraic Geometry, Number Theory and Applications in Cryptography and Robot kinematics*. It was intended for;

- African women mathematicians
- Doctoral students;
- Faculty members ;
- *All those who are interested in mathematics.*

The conference focused on scientific presentations and the situation of women mathematicians. The program includes 12 presentations and short communications. Some representatives from the various countries with national organizations for women in mathematics will participate. The main objectives of this workshop were

- to bring together African female Mathematicians to Cameroon so that they could motivate, as role models, more young Cameroonian girls, girls and women of the region to pursue studies and hence careers in Mathematics and Mathematics related disciplines.
- to illustrate how Mathematics is used to solve real world problems in order to promote participation of AWMA in the development of Africa .
- to promote cooperation and exchange ideas in mathematics research and teaching, and create networks for inspiring and stimulating young girls and women.

## Conference Proceedings

This event hold at the AIMS-CAMEROON in Limbe (<https://aims-cameroon.org/>). Founded in 1857 on the southern flank of Mount Cameroon, Limbe has become a popular seaside resort. It is located in a bay against the side of the volcanic chain. Beaches of black sand constitute the maritime facade of the city, making Limbe, the most popular seaside resorts of Cameroon. It has two natural parks, the Limbe Wildlife Center and the Botanical Garden of Limbe.

The Organizing Committee is grateful and thankful to the sponsors for their help, support and encouragements that made realize this workshop.

International organizing Committee:

- Prof. Marie Françoise Ouedraogo (Université Ouaga JKZ, Burkina Faso)
- Prof. Rebecca Walo (Université de Kinshasa, RD Congo)
- Prof. Schehrazad Selmane (Université Sciences and Technology Houari Boumediene, Algeria)

- Prof. Josephine Guidy-Wandja (Université d'Abidjan, Côte d'Ivoire)

Local organizing committee:

- Dr. Aminatou Pecha (Université de Maroua, Cameroun)
- Dr. Fomboh Nforba Mary (University of Buea, Cameroon)
- Dr Nfor Vivian (University of Bamenda, Cameroon)
- Dr Hanwa Anne (Université de Ngaoundéré, Cameroun)

Main Speakers:

- Prof. Fatma Zohra Nouri (University Badji Mokhtar, Annaba, Algeria)
- Prof. Tony Ezome (Université de Libreville, Gabon)
- Dr Fouotsa Emmanuel (University of Bamenda, Cameroon)
- Prof. Josephine Guidy-Wandja (Université d'Abidjan, Côte d'Ivoire)

The workshop attracted ... participants from at least 11 African Countries within the continent: Algeria [1], Burkina Faso [1], Cameroon [], Congo [], France [4], Niger [], Nigeria [], Senegal [1].

The programme was as follows:

### Day 1: Saturday 13<sup>th</sup> July 2019

The opening ceremony ... **(To be completed)**

The first presentation of the workshop was the Film : Journeys of Women in Mathematics, ... **(To be completed)** This presentation was followed by a presentation of CAWOMA by Mrs. Anne Hanwa... **(To be completed)** The first lecture was given by Dr Emmanuel Fouotsa from University of Bamenda, on “Efficient Computation of the Final Exponentiation in Paring-Based Cryptography”.

The second lecture was given by Prof. Fatma Zohra Nouri from University Badji Mokhtar, on: “Stabilised Numerical Methods for a Pollution Problem”. She presented a system of partial differential equations that models the organic pollution in lakes or estuaries and a a stable scheme based on finite element discretizations to demonstrate optimal a priori and a posteriori error estimates.

The third presentation was given by Prof. Josephine Guidy-Wandja from Université d'Abidjan on the film "**Hidden Figures**". This film is an adaptation of Margot Lee Shetterly's book "**Hidden Figures**", the story tells the incredible destiny, course, fight and especially work of three African American women at the heart of NASA in the 1950/60, crucial for the American space conquest.

These lectures were followed by contributions of Dr. Entissar Arasheed Sidahmed from University of Bahri – Soudan on “Applications of number theory in Cryptography” and Dr Nfor Vivian from University of Bamenda on “Approximate Solution for solving Fredholm Integral Eq. of 1<sup>st</sup> Kind with Oscillatory Kernels”.

The day ended with adiscussion about CAWOMA and women mathematicians in central Africa. **(To be completed)**

### Day 2: Sunday 14<sup>th</sup> July 2019

The day began with the lecture of Prof. Tony Ezome, from Université de Libreville on the theme “Some Algorithms for Prime detection and Primality Proving”. He was concerned with algorithms to determine if a given integer is prime or composite. For that, he described the Miller-Rabin test and

the Pocklington-Lehmer algorithm and used Galois ring extensions of the ring of integers and how to use them for prime detection and primality proving.

This lecture was followed by the second presentation of Prof. Josephine Guidy-Wandja from Université d'Abidjan on the theme "fractal discovery". She noticed that the euclidean geometry mainly studies smooth and regular shapes such as straight lines, circles, rectangles, cubes, cones, etc. But the objects or phenomena of nature are not all smooth and the real world is also filled innumerable iterations and objects that are sometimes serrated, pointed, curved, rough, and almost at all scales. This led to the definition and studies of fractals, for a first time by the mathematician Benoît Mandelbrot, who was interested in the objects of nature that Euclidean geometry could not describe.

The third lecture was a presentation of "sagemath" given by Prof. Samuel Lelièvre from Université de Paris-Sud, who presented the software "Sage", the community of users of "sage", women in sage and sage in Africa.

These lectures were followed by contributions of Dr. Faguèye Ndiaye from Université Cheikh Anta Diop, on "Conformal Transformation Method for irrigation Dirichlet Problem" and Mrs. Joseline Youego from Université de Ngaoundéré on "Supersingular Elliptic Curves in Cryptography".

The workshop W-PACOM 2017 ended with the closing ceremony.

## **FUNDERS/SPONSORS**

Many thanks to all the sponsors for their financial support:

- AIMS Cameroon
- Committee for Women in Mathematics of International Mathematical Union (CWM for IMU)
- European Mathematics Society Committee for Developing Countries (EMS-CDC)
- UNESCO
- Pole of Research in Mathematics and their Applications in Information Security (PRMAIS)