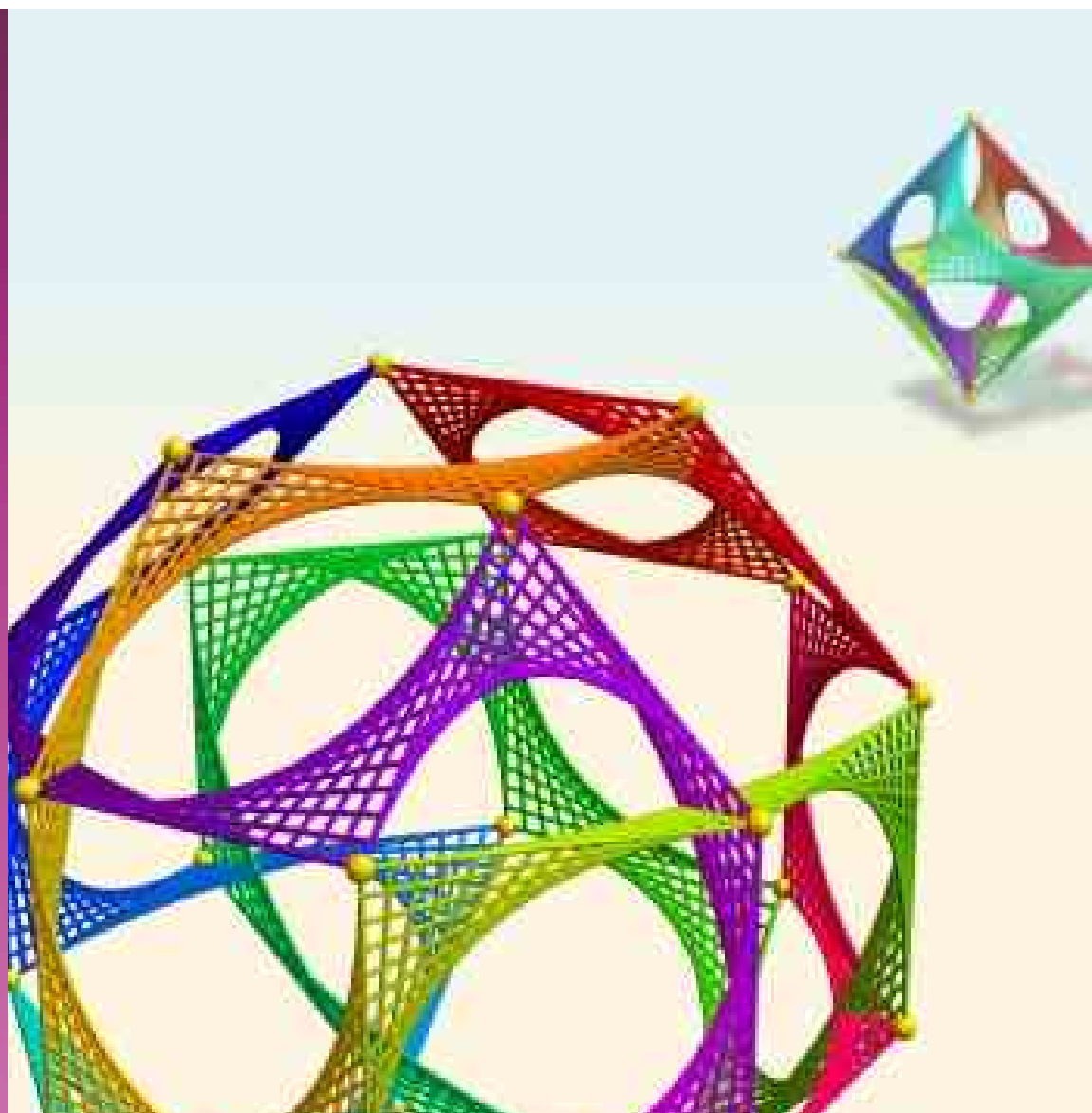


Notices

OF THE NIGERIAN MATHEMATICAL SOCIETY

E-mail: noticesnms@gmail.com

Volume 8, No. 1, 2019



Cover image: String Circuit Polyhedra - The underlying polyhedral shapes are an octahedron, a cuboctahedron, and one made from 18 squares and eight triangles. Each polyhedron has a path that visits all the edges once and only once, returning to its original vertex. A rainbow of line segments then tracks its progress along this Eulerian circuit! Follow the journey with your eyes.

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EDITOR - PROFESSOR SAMUEL SEGUN OKOYA

Reciprocal societies: Nigerian Mathematical Society



The Nigerian Mathematical Society (NMS) was established in February 1982 at University of Ibadan when sixty-two Mathematicians from almost all the existing Universities and Colleges in Nigeria came together to hold a conference. At that conference, Professor Adegoke Olubummo was elected as the NMS's first President, Professor Christopher. O. Imoru its first Secretary and Professor Haroon Oladipo Tejumola was elected as the first Editor-in-Chief of *Journal of the Nigerian Mathematical Society* (JNMS).

The aims of the NMS are to promote research and applications in mathematical sciences through:

- (1) Holding of conferences, symposia, seminars, workshops, etc.,
- (2) Publishing of JNMS and other publications;
- (3) Awarding of prizes for outstanding mathematical research especially to young mathematicians and;
- (4) Cooperating/affiliating with other bodies with similar aims as those of NMS.

In fulfilment of its aims, the NMS has been organising annual conferences in rotational basis in Nigerian Universities since 1982. The 38th annual conference is scheduled to be held at the University of Nigeria, Nsukka in June 2019. Attendance at the annual conferences has increased to over 500 participants in recent years.

The JNMS has been published yearly since inception with at least one volume annually. In 2015, the JNMS operated as the first registered mathematical journal under the Nigeria-Elsevier-Partnership (NEP) which further increased the visibility and readership of the journal. In addition, JNMS increased from one journal issue per year to three issues per year commencing with volume 34 (2015) which contains three issues. However, due to financial challenges, the NEP agreement was terminated in early 2016. A memorandum of understanding was thereafter signed with the Abdus Salam International Centre for Theoretical Physics, Trieste, Italy for JNMS to go live on

the Open Journal System (OJS). This has helped to improve the journal contents, maintain high quality and speed of publications. JNMS can be downloaded at ojs.ictp.it/jnms/index.

In 2015, at the 34th annual conference held at the University of Lagos at the NMS, commenced the award of the Fellow of the Nigerian Mathematical Society (FNMS) to outstanding mathematicians who have contributed immensely to the development of Mathematics in Nigeria and the growth of NMS. NMS also instituted annual award of prizes to outstanding PhD which is presented during the annual conferences. The Society commenced the publication of the *NMS Notices* in 2008.



Investiture of FNMS, 2016

NMS is affiliated with the London Mathematical Society and the American Mathematical Society. NMS has been encouraging and supporting the Nigerian Women in Mathematics (NWM) to organize meetings and conferences. A position is reserved for NWM on the Council of NMS. Furthermore, NMS is in collaborating with the National Mathematical Centre, Abuja and other Mathematical associations in Nigeria.

Professor N.I. Akinwande and Professor G.C.E. Mbah are the current President and Secretary respectively. Professor Samuel S. Okoya is the current Editor-In-Chief of the JNMS. Further information about the NMS can be sourced from the website: www.nigerianmathematicalsociety.org.

Ninuola I. Akinwande
President of the NMS

Editor's note: the LMS and the NMS have a reciprocity agreement meaning members of either society may benefit from discounted membership of the other.



HIS EXCELLENCY

MUHAMMADU BUHARI *GCFR*

PRESIDENT, COMMANDER-IN-CHIEF OF THE ARMED FORCES
FEDERAL REPUBLIC OF NIGERIA



HIS EXCELLENCY

LAWRENCE IFEANYI UGWUANYI

EXECUTIVE GOVERNOR ENUGU STATE

SPECIAL GUEST OF HONOUR

38TH ANNUAL CONFERENCE OF THE NMS, NSUKKA 2019



VICE CHANCELLOR

PROF. CHARLES IGWE

UNIVERSITY OF NIGERIA, ENUGU STATE

CHIEF HOST

38TH ANNUAL CONFERENCE OF THE NMS, NSUKKA 2019



PROF. NINUOLA IFEOLUWA AKINWANDE *FNMS*

THE PRESIDENT OF THE
NIGERIAN MATHEMATICAL SOCIETY (NMS)

COUNCIL MEMBERS

THE NIGERIAN MATHEMATICAL SOCIETY

	NAME	POST	INSTITUTION
1.	Prof. N. I. Akinwande	President	Federal University of Technology, Minna
2.	Prof. D. G. Yakubu	Vice President	Abubakar Tafawa Balewa University, Bauchi
3.	Prof. G. C. E. Mbah	Secretary	University of Nigeria, Nsukka
4.	Dr. S. Abdulrahman	Asst. Secretary	Federal University Birnin-Kebbi, Kebi State
5.	Prof. H. O. Adagba	Treasurer	Ebonyi State University, Abakaliki
6.	Prof. S. S. Okoya	Editor-in-Chief	Obafemi Awolowo University, Ile-Ife
7.	Prof. O. J. Adeniran	Business Manager	Federal University of Agriculture, Abeokuta
8.	Prof. M. R. Odekunle	Ex-Officio	Modibbo Adama University of Technology, Yola
9.	Prof. J. A. Oguntuase	Ex-Officio	Federal University of Agriculture, Abeokuta
10.	Prof. M. O. Osilike	Immediate Past President	University of Nigeria, Nsukka
11.	Dr (Mrs) D. O. Makinde	Member	Obafemi Awolowo University, Ile-Ife
12.	Prof. E. S. Onah	Member	National Mathematical Centre, Abuja



Prof. N. I. Akinwande *FNMS*



Prof. D. G. Yakubu



Prof. G. C. E. Mbah



Dr. S. Abdulrahman



Prof. H. O. Adagba



Prof. S. S. Okoya *FNMS, FMAN*



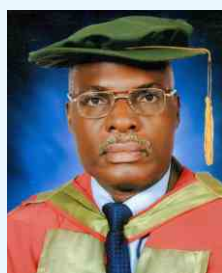
Prof. O. J. Adeniran



Prof. M. R. Odekunle



Prof. J. A. Oguntuase *FNMS*



Prof. M. O. Osilike *FNMS*



Dr (Mrs) D. O. Makinde



Prof. E. S. Onah

LIST OF FELLOWS OF THE NMS

In retrospect, the NMS has made awards of fellow to a number of mathematicians at home and abroad for their meritorious service towards the advancement of mathematics in Nigeria and abroad.

2015 RECIPIENTS

1. Professor Iya ABUBAKAR (*FNMS*)
2. Pastor Enoch Adejare ADEBOYE (*FNMS*)
3. Professor James Nwoye ADICHIE (*FNMS*)
4. Professor Eben Akin AKINRELERE (*FNMS*)
5. Professor Samuel Akindiji ILORI (*FNMS*)
6. Professor Olusola AKINYELE (*FNMS*)
7. Professor John Chukwuemeka AMAZIGO (*FNMS*)
8. Professor Sunday Osarumwense IYAHEN (*FNMS*)
9. Professor Monsur Akangbe KENKU (*FNMS*)
10. Professor Aderemi Oluyomi KUKU (*FNMS*)
11. Professor Emmanuel Oguntokun OSHOBI (*FNMS*)
12. Professor Kevin Ejere OSONDU (*FNMS*)

2016 RECIPIENTS

13. Professor Kayode Rufus ADEBOYE (*FNMS*)
14. Professor Anthony Uyi AFUWAPE (*FNMS*)
15. Professor Michael Olusanya AJETUNMOBI (*FNMS*)
16. Professor Ninuola Ifeoluwa AKINWNDE (*FNMS*)
17. Professor Udot Isaac ASIBONG (*FNMS*)
18. Professor Charles Ejikeme CHIDUME (*FNMS*)
19. Professor Godwin O. Samuel EKHAGUERE (*FNMS*)
20. Professor Jacob Abiodun GBADEYAN (*FNMS*)
21. Professor Oyewusi IBIDAPO-OBE (*FNMS*)
22. Professor Frank Ikechukwu OCHOR (*FNMS*)
23. Chief Ajibola OGUNSOLA (*FNMS*)
24. Professor James Adedayo OGUNTUASE (*FNMS*)
25. Professor Samuel Segun OKOYA (*FNMS*)
26. Professor Peter ONUMANYI (*FNMS*)
27. Professor Micah Okwuchukwu OSILIKE (*FNMS*)
28. Professor Babangida SANI (*FNMS*)
29. Professor Adewale Roland Tunde SOLARIN (*FNMS*)
30. Professor Abba Ali TIJJANI (*FNMS*)

2017 RECIPIENTS

31. Professor Jerome Ajayi ADEPOJU (*FNMS*)
32. Professor Alexander O. E. ANIMALU (*FNMS*)
33. Professor Iheanyichukwu Sylvester IWUEZE (*FNMS*)
34. Professor Francis Kofi Ampenyin ALLOTEY (*FNMS*)

2018 RECIPIENTS

35. Professor Muhammad Yahuza BELLO (*FNMS*)
36. Professor Anthony Monday ETTE (*FNMS*)
37. Professor Emmanuel Joseph Daniyang GARBA (*FNMS*)
38. Professor Moses Oludotun OYESANYA (*FNMS*)
39. Professor Olabisi Oreofe UGBEBOR (*FNMS*)

PRESIDENT'S REMARKS

*Professor Ninuola Akinwande, FNMS
President, NMS (2015 - 2019)*



It gives me great pleasure to make these few remarks for the 2019 edition of the NMS Notices.

The Nigerian Mathematical Society, (NMS) was founded 38 years ago. The Society has consistently held her annual conference since inception, moving it all across the country. In the recent time the hosting institutions are as reflected below.

YEAR	INSTITUTION
2014	African University of Science & Technology, Abuja
2015	University of Lagos, Akoka
2016	Federal University of Technology, Minna
2017	Federal University of Agriculture, Makurdi
2018	Bayero University, Kano
2019	University of Nigeria, Nsukka

The conference attracts Mathematical Scientists from across the country and abroad. Some Scientists in the West African sub-region are registered members of the Society.

The Journal of the Nigerian Mathematical Society JNMS was launched at the inception of the Society. Issues 1, 2 & 3, Volume 37 of the Journal will be unveiled at the 38th annual conference slated for June 18-21, 2019 at the University of Nigeria, Nsukka. TETFund sponsored the publication and distribution of the Journal editions from 2012 – 2016; though we are yet to fully recover the full sponsorship grant from TETFund. The NUC/CVC also shortlisted the Journal for publication linkage with Elsevier, this was short-lived as there was no financial commitment from the sponsors beyond one year. Despite obvious challenges, the Journal is waxing stronger.

The NMS inaugurated the award of the Fellow of the Nigerian Mathematical Society, FNMS, in 2015. Many eminent Mathematical Scientists have received the award since it was inaugurated. The NMS also award prizes to outstanding PhD thesis on annual basis.

The London Mathematical Society, LMS, requested for a brief write-up on the NMS, this is expected to appear in the LMS bulletin in May 2019. The submission is included in this bulletin.

The NMS website is active, all members are encouraged to regularly visit the site as information on the society are obtainable there. In addition information on events of other international mathematical organizations are regularly posted there. Members can also register and obtain permanent membership registration number on the website. The website address is www.nigerianmathematicalsociety.org.

The National Mathematical Centre, NMC, Abuja assisted with the payment of the 2015, 2016 and 2017 annual dues to the International Mathematical Union, IMU. The NMC also coordinated the joint meeting of the Presidents of Mathematical Societies/Associations where the arrangement for contributions for the payment of the IMU annual due was reached. With this arrangement, the dues for 2018 and 2019 were raised and off-set. The NMC has always supported our conferences. As a token of our appreciation we now give four (4) copies of current editions of JNMS to the Library of the NMC free of charge.

Mathematics is a tool for problem solving and the driving force for meaningful Scientific, Economic and Technological breakthroughs and advancement and so should be given all the support needed for scholarship.

Long live NMS,

Long live the Federal Republic of Nigeria and Africa.

NMS DELEGATES VISIT TO THE EMIR OF KANO, ALHAJI MUHAMMADU SANUSI II, APRIL, 2018





Thank You
Abba B. Gumel

PhD, FAS, FAAS, FCBCS (ASU-Santa Fe Institute)

Professor of Mathematics & C. Castillo-Chavez
Professor of Mathematical Biology

for support for best Ph.D Mathematics thesis.

- *Your gift assists young mathematicians and*
- *helps mathematics advance*

2018/2019 EVENTS

Photo album of the Visit of the NMS council members to Vice Chancellor, University of Nigeria (UNN), Nsukka in September 2018 in preparation for the 38th Annual conference of NMS to be hosted at UNN



Front: L – R: Mrs Stella Okonkwo (Deputy registrar , VC's office, UNN), Prof James C. Ogbonna (DVC Academics), Prof Ninuola I. Akinwande (President, NMS), Prof Uchechukwu C. Okoro (Dean, Faculty of Physical Sciences), Mr Charles Ebizie (Deputy Registrar, Council Unit), Prof. (Mrs) Patience O. Osadebe (Dean, School of Postgraduate studies)



L-R: Prof G. C. E. Mbah (HOD Mathematics and Chairman, LOC of the 2019 NMS conference), Prof N. I Akinwande (President of the NMS), Prof U. C. Okoro (Dean of the Faculty of Physical Sciences)



The Dean of the Faculty of Physical Sciences with members of the Council of NMS , Secretary LOC and the NMS website manager.



Picture of Prof. J. O. C. Ezeilo on the wall of the VC conference room as the 5th Vice Chancellor of the University of Nigeria, Nsukka. Prof J. O. C. Ezeilo was an acclaimed Mathematician.



Principal Officers of the University with the members of the council of Nigerian Mathematical Society.



Group photograph of delegates at BUK, 2018



Nigerian & Indian Mathematicians at ICM2018, Pavilion 5, Riocentro, Rio de Janeiro, Brazil: 1st - 9th August, 2018



Prof. (Mrs.) Ugbebor and Ife O. Ugbebor (her youngest son) with the NMS President and wife to the right in the background at BUK 2018



The President making a presentation to Prof. Muhammad Yahuza Bello at BUK 2018



The President (middle) and the Secretary (left), NMS making presentation to Prof. M. O. Oyesanya at BUK 2018



Prof. Anthony M. Ette at BUK 2018

2ND CONFERENCE OF WEST AFRICAN WOMEN IN MATHEMATICS HELD AT UNIVERSITY OF IBADAN, IBADAN, OYO STATE, NIGERIA ON 25TH- 26TH JUNE, 2018

The second conference of the West African Women in Mathematics, tagged "Addressing Gender Inequality Menace: Roles of Employment and Government Policies", took place at the University of Ibadan, Ibadan from **25 - 27 June, 2018**, organized and hosted by the Nigerian Women in Mathematics. The keynote address was given by Mrs. Stella Omu, Director, Federal Ministry of Education, Abuja, Nigeria. The conference was preceded by a one week school on Mathematical Finance from **18 - 23 June, 2018**. Both the conference and the school recorded about 82 male and female participants out of which 40 were foreign participants. Plenary speakers were also from both Nigeria and outside Nigeria.

Among the dignitaries that were present are:

- Vice Chancellor, University of Ibadan ably represented by the Deputy Vice Chancellor (Administration)
- The Representative of the Governor of Oyo State
- The Vice President, African Women in Mathematics (Josephine Guigy-Wandja)
- Representative from National Mathematical Centre, Abuja
- Representative from Nigeria Mathematical Society (Prof. S. Adeniran)
- The Head of Mathematics Department, University of Ibadan (Dr. U. N. Bassey)
- Prof. Sola Adeniran, the representative from Nigeria Mathematical Society
- Career talk with secondary school girls was also organized during the conference and the following schools participated.

1. Methodist Grammar School, Bodija
2. Abadina College, Senior School, Ibadan
3. Abadina Grammar School, Ibadan
4. Oritamefa Baptist Model School, Ibadan
5. Bethel Comprehensive College, Ibadan
6. International School, Ibadan (ISI)

The conference was concluded with a symposium from which a communiqué was reached, followed by conference dinner at Agodi Garden, Secretariat, Ibadan.

The following people donated towards the successful holding of the conference: International Mathematics Union – Commission for Women in Mathematics (IMU-

CWM); National Mathematical Centre, Kwali, Abuja (under the Chairmanship of the Professor E. S. Onah); Nigerian Mathematical Society (under the Presidency of Professor N.I. Akinwande); The Vice-Chancellor, University of Ibadan, Ibadan; Department of Mathematics, University of Ibadan, Ibadan; Pastor Adeboye Professorial Chair, University of Ibadan, Ibadan; Pastor E.A Adeboye and Professor O.O. Ugbebor.



Keynote Address being delivered at the 2nd Conference of the West African Women in Mathematics by the Director, Federal Ministry of Education, Abuja - Mrs. Stella Omu



An overview of male participants at the 2nd Conference of the West African Women in Mathematics



Cutting cake for the successful Hosting of the 2nd Conference of the West African Women in Mathematics

THE 37TH ANNUAL CONFERENCE **OF THE NIGERIAN MATHEMATICAL SOCIETY (NMS)** **HOSTED BY THE DEPARTMENT OF MATHEMATICAL SCIENCES,** **BAYERO UNIVERSITY, KANO (2018)**

The Department of Mathematical Sciences, Bayero University, Kano (BUK), successfully hosted the 37th annual conference of the Nigerian Mathematical Society (NMS) held between 8th and 11th May, 2018. The Conference which had the theme: “**Mathematics: A Veritable Tool for Solving Socio-Economic, Scientific and Technological Challenges**”, was attended by a very large number of participants from within and outside Nigeria. The turnout in the Conference was, perhaps, one of the largest in the history of the Society.

The opening ceremony took place on the 9th of May 2018 in the Mahmud Tukur Theatres before a very large crowd of participants and other invited guests. The Chief host and Vice Chancellor of BUK, Professor Muhammad Yahuza Bello, a fellow mathematician, was represented by his deputy, DVC Academic, Professor Sagir Abbas, as he was out of the country conducting some official exercise on that day. The DVC academic declared the Conference open in the presence of many members of the University management team, Deans of Faculties, Heads of Departments and other invited guests. Four mathematicians out of the five indicated were inducted as Fellows of the Nigerian Mathematical Society at the occasion. Also six Best PhD awards were given to the winners during the occasion.

On the 10th of May 2018 a courtesy call under the leadership of Professor Abba Babandi Gumel was paid to the emir of Kano, HRH Sanusi Lamido Sanusi, by council members, plenary speakers and some of the participants in his historical palace. During the visit the Emir expressed happiness in receiving the visitors and also challenged the participants to come up with mathematical solutions to the Nigerian economic problems.

Out of the five plenary speakers, three were able to attend the Conference and gave their respective talks. They were: Professor CE Chidume, Professor AB Gumel and Professor MO Ajetonmobi.

On the second day (Thursday 10th May, 2019), the fifth mathematician who happened to be the VC of BUK was inducted as a Fellow of the Nigerian Mathematical Society. Parallel sessions continued after that.

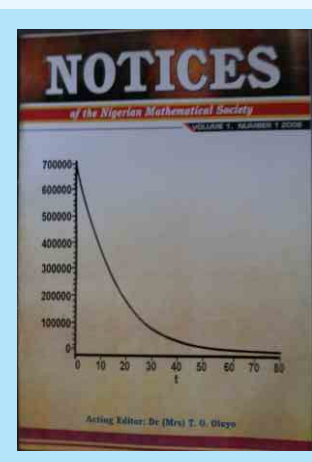
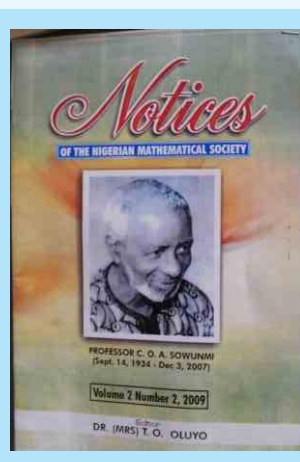
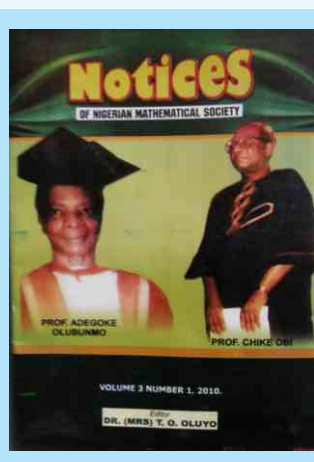
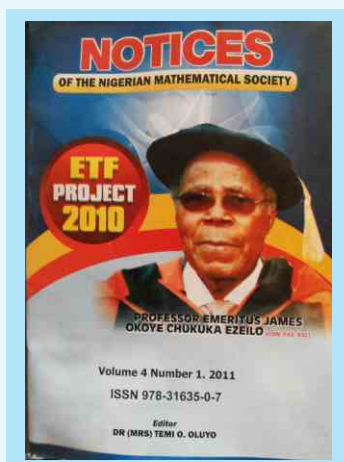
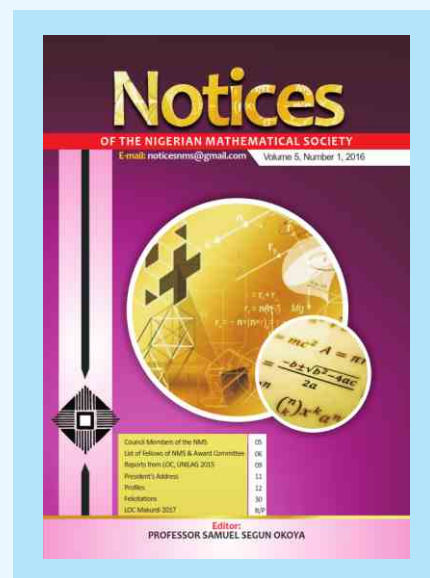
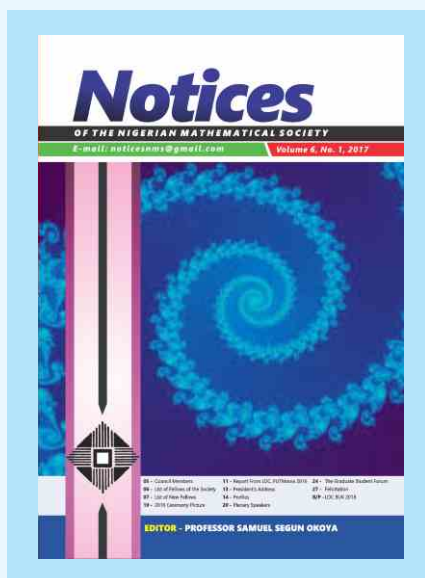
The Conference was a great success as attested to by the participants. We thank God the almighty for that. In addition, this success was largely due to support and cooperation the Department received from many quarters. Principally, support received from the Vice Chancellor of Bayero University, Kano; the TETFund under the leadership of Dr. Abdullahi Baffa Bichi; the Vice Chancellor of Kano University of Science and Technology, Wudil was instrumental to the success. The kind support of other individuals and organizations was also very helpful in organizing the conference. None of the fund-raising job and other tedious tasks of organizing the conference would have been successful without the hardwork and dedication of members of the Local Organizing Committee (LOC).

The annual general meeting followed a first-rate conference dinner sponsored by the Vice Chancellor of BUK. Afterwards, participants departed on a very delightful note and with a great feeling of satisfaction.

Prof. Bashir Ali
The Chairman, LOC, BUK 2018 and
Head of Department

Dr. Ma'aruf S. Minjibir
The Secretary,
LOC, BUK 2018

FRONT COVERS OF PAST NOTICES OF THE NMS



PLEASE MAKE SURE THAT THE **NOTICES OF THE NMS**
FIND A HOME ON EVERY MATHEMATICIAN'S DESK

**ADDRESS BY THE PRESIDENT OF THE NIGERIAN MATHEMATICAL SOCIETY
(NMS), PROFESSOR N. I. AKINWANDE FNMS, AT THE COURTESY VISIT OF SOME
COUNCIL MEMBERS TO THE DIRECTOR/CHIEF EXECUTIVE OF NATIONAL
MATHEMATICAL CENTRE (NMC), ABUJA, NIGERIA ON MAY 7TH, 2019.**

The Director/Chief Executive, NMC, Abuja and the principal officers present, we are grateful to you, for despite your tight schedule of duty you have graciously granted us audience this day. We wish you good success in all your undertakings.

Here, we have some members of the Council of the Nigerian Mathematical Society, NMS, a research based society in Mathematical Sciences founded 38 years ago by University Teachers and Researchers in Mathematics. This team comprises of:

1. Prof. N. I. Akinwande - President (FUT, Minna)
2. Prof. H. O. Adagba - Treasurer (EBSU, Abakaliki)
3. Prof. D. G. Yakubu - Vice President, ATBU, Bauchi
4. Prof. M. O. Osilike - Immediate Past President (UNN, Nsukka)
5. Prof. Bashir Ali - Former Vice President (BUK, Kano)
6. Dr. Timothy Ashezua - Member (UAM, Makurdi)
7. Dr. Mrs. Rose Abba - Member (UNI-ABUJA)

I want to specially thank Professor Onah, the Director/Chief Executive of the National Mathematical Centre, Abuja, for also setting time aside to accompany us on a courtesy visit to TETFund.

We have noted your giant strides since you took over the mantle of leadership at the Centre. Worthy of note are:

1. The consistent support of the NMC under your leadership for the Annual Conference of the Society. You were with us at Makurdi in 2017, at Kano in 2018 and we look forward to having you with us at Nsukka from June 18 -21, 2019. In all these you never came empty-handed. I have been reliably informed that you have approved something for the support of the 2019 conference. Thank you Sir.
2. Also the Centre assisted in the payment of the IMU dues for 2015, 2016 and 2017 which was becoming an international embarrassment as the IMU threatened to withdraw the membership of Nigeria last year, giving us a deadline of April 30.
3. With your assistance as well, you rallied together all the Presidents of Mathematical Societies and Associations thereby got them committed to making joint contributions annually to take care of the IMU due as the Centre assist with the remittance to IMU. With this arrangement, the 2018 and 2019 IMU dues were already taken care of.
4. As a gesture on our part, we have resolved to give four (4) copies of each of our subsequent journal publications to the NMC free of charge.

We wish to assure you of our continuous support and cooperation.

Thank you.

Prof. N. I. Akinwande, FNMS
President, NMS.

**ADDRESS BY THE PRESIDENT OF THE NIGERIAN MATHEMATICAL SOCIETY (NMS),
PROFESSOR N. I. AKINWANDE FNMS, AT THE COURTESY VISIT OF SOME COUNCIL
MEMBERS TO THE EXECUTIVE SECRETARY OF TETFUND ON MAY 7TH, 2019.**

The Executive Secretary of TETFund and the principal officers present, We are grateful to the E.S, for despite tight schedule of duty, you have graciously granted us this audience this day. We wish you good success in all your undertakings. Here we have some members of the Council of the Nigerian Mathematical Society, NMS, a Research based society in Mathematical Sciences founded 38 years ago by University teachers and researchers in Mathematics. This team comprises of

1. Prof. N. I. Akinwande - President (FUT, Minna)
2. Prof. H. O. Adagba -Treasurer (EBSU, Abakaliki)
3. Prof. D. G. Yakubu -Vice President, ATBU, Bauchi
4. Prof. M. O. Osilike -Immediate Past President (UNN, Nsukka)
5. Prof. Bashir Ali -Former Vice President (BUK, Kano)
6. Prof. E. S. Onah - Director/Chief Executive, National Mathematical Centre, Abuja
7. Dr. Timothy Ashezua -Member (UAM, Makurdi)
8. Dr. Mrs. Rose Abba - Member (UNI-ABUJA)

I also wish to thank Professor Onah, the Director/Chief Executive of the National Mathematical Centre, Abuja, for also setting time aside to accompany us on this visit to TETFund.

We also congratulate the E.S. TETFund on his reinstatement as the head of the organization.

With this golden opportunity before us sir, we wish to draw your attention to certain issues that pertain to our Society and has bearing with your office as we look forward to your kind favourable response and intervention as far as your powers can go.

1. Sometimes in 2011/2012, the Journal of the Nigerian Mathematical Society (JNMS) was selected among other journals to benefit from publication grant from TETFund in the sum of 5 million Naira. The NMS had published and distributed five (5) volumes of the JNMS to all Nigerian higher institutions as approved and directed by TETFund. These are volumes 31 (2012), 32(2013), 33(2014), 34(2015) and 35(2016); all bearing the logo of TETFund. The sum of 2.5 million Naira was paid to the NMS. We wish to request for the release of the last tranche of the Journal Grant, which is 2.5 million Naira.

The Bank Details of the NMS:

The account details of the NMS is:

A/c Name: Nigerian Mathematical Society

A/c Number: 2026734361, First Bank.

2. Since the inception of the NMS 38 years ago, the Society holds annual conference which is moved round the country. In recent times, the institutions that hosted the conference are outlined below:



Courtesy visit of some Council members to the Executive Secretary of TETFUND on May 7th, 2019. In the middle is Prof. N. I. Akinwande, President, NMS; to his right is the E.S. TETFUND and to his left is Director/Chief Executive, NMC, Abuja.



Prof. N. I. Akinwande, President, NMS (right), Prof. E. S. Onah, Director/Chief Executive, NMC, Abuja (left) together with the Executive Secretary, TETFUND in his office when some Council members of the NMS paid a courtesy visit to TETFUND.

YEAR	INSTITUTION
2014	African University of Science & Technology, Abuja
2015	University of Lagos, Akoka
2016	Federal University of Technology, Minna
2017	Federal University of Agriculture, Makurdi
2018	Bayero University, Kano
2019	University of Nigeria, Nsukka

We wish to request for yearly financial support for our conference. This year the 38TH ANNUAL CONFERENCE OF THE NIGERIAN MATHEMATICAL SOCIETY is scheduled to hold from June 18 – 21, 2019 at the University of Nigeria Nsukka. The society will use such fund to support the participation of women and postgraduate students and the TETFund will be acknowledged accordingly.

3. Nigeria is a member of the International Mathematical Union, IMU and the NMS is the affiliate body representing Nigeria. Presently, the annual due is about 1,500 Euro. Nigeria was almost de-registered in 2018 as we could not get fund to offset the 2015, 2016 and 2017 dues. It was the NMC that came to our rescue. It was going to be a National embarrassment. We therefore wish to appeal to the TETFund to kindly take this burden off our shoulder by assisting the NMS to offset this annual due on a regular basis.

It will interest you sir to know that Nigeria is in category 1, out of 5 level-categories. We have the academic capability and potential to move up but we are afraid to do so because the higher your Country's category, the higher the due. Algeria, Egypt and South Africa are already in the higher categories.

4. Also sir, in 2014/2015, the JNMS was shortlisted among six (6) other journals for sponsorship by the NUC/CVC on the platform of ELSEVIER for publications. The sponsorship lasted only one year as fund was not paid to the Elsevier for the subsequent year. The Elsevier demanded 36,000 US Dollars from the NMS if we were to continue on their platform. We had to pull out and source for other avenue. This was not good enough for the image of the country. Our desire is to go back to Elsevier and we are looking up to the TETFund to be able to accomplish this.
5. Last but not the least, we wish to request that you find a way out and support postgraduate and research component at the National Mathematical Centre, Abuja. When the Centre started, most of us here were invited to the Centre and taught high level Mathematics with free feeding, boarding and lodging. It has become increasingly difficult for the Centre to carry on with this noble cause for lack of financial support.

Conclusion

Sir, Mathematicians are endangered species of academicians worldwide, Nigeria is not an exception. The NMC, NMS and notable Mathematicians are relentlessly addressing this major challenge. Worthy of note, among these efforts, are the various laudable programmes of the NMC to address critical problem areas and grow Mathematicians. Mathematics is the driving force for meaningful Scientific and Technological breakthroughs and advancement and so should be given all the support needed for scholarship. Mathematics is a language of precision, accuracy and a Science of problem solving.

We need all the support you can give.

Thank you.

Prof. N. I. Akinwande, FNMS

President, NMS.

**REPORT ON COURTESY VISITS TO THE NATIONAL
MATHEMATICAL CENTRE, NMC & TERTIARY EDUCATION TRUST
FUND, TETFUND ON MAY 7TH, 2019.**

The President, Prof. N. I. Akinwande led a delegation of the NMS on courtesy visits to the offices of Prof. E. S. Onah, Director/Chief Executive, National Mathematical Centre, Abuja and Prof. Suleiman Bogoro, Executive Secretary, Tertiary Education Trust Fund, TETFUND on Tuesday May 7th 2019.

We were at the office of the Director/C.E of NMC by 9 am where he warmly received us. We had quite fruitful interactions. The President, NMS thanked him for his support to the Society since his assumption of office as the Director/C.E, NMC. Notable is his intervention with respect to the payment of the annual dues to the International Mathematical Union, IMU. To date, the dues for 2015 to 2019 has been cleared. Also is the consistent financial support for the NMS conference and his personal presence at such conferences. The President, NMS thanked him for accepting to be on our team to visit the E.S of TETFUND.

The Director/C.E thanked the delegation of the NMS regarding the Society as partner in progress. He thanked the Society for supporting the library with four (4) copies of the JNMS from each publication. He said the Centre will review the reciprocity agreement and order for some copies of the Journal for exchange with the international communities.

Thereafter he accompanied the team to pay courtesy visit to the E.S., TETFUND.

The team that went to TETFUND comprised of:

1. Prof. N. I. Akinwande - President (FUT, Minna)
2. Prof. H. O. Adagba - Treasurer (EBSU, Abakaliki)
3. Prof. D. G. Yakubu - Vice President, ATBU, Bauchi
4. Prof. M. O. Osilike - Immediate Past President (UNN, Nsukka)
5. Prof. Bashir Ali - Former Vice President (BUK, Kano)
6. Prof. E. S. Onah - Director/Chief Executive, National Mathematical Centre, Abuja
7. Dr. Timothy Ashezua - Member (UAM, Makurdi)
8. Dr. Mrs. Rose Abba - Member (UNI-ABUJA)

Together with the Personal Assistant to the Director, NMC.

The E.S. TETFUND welcomed us into his office at about 3:30 pm. After the introduction of the members of the delegation, the President thanked the E.S for making time out of his obvious tight schedule to receive us. He then presented our requests which included

- (i) Payment of the outstanding balance of 2.5 million Naira for the printing and distributions of 500 copies each of the JNMS to Tertiary institutions from 2012 to 2016 at the instance of TETFUND.
- (ii) Support for the NMS annual conference.
- (iii) Support for the JNMS to get back onto the platform of Elsevier.
- (iv) Support for the research and postgraduate programmes of the NMC.

Prof. Osilike and Prof. Onah then threw more light on the submissions of the President.

In his response, the E.S acknowledged the importance of Mathematics in the overall development of the nation; that he responded favourably to our request for a visit based on this understanding as such requests are many and the time is just not available due purely to exigencies of office.

He said he had approved the payment of the outstanding balance of 2.5 million Naira for JNMS support which we should receive within two weeks at the latest.

He hinted the team that the government is interested in getting NMC back on the list of institutions to be supported by TETFUND and some arrangement will be worked out which may involve some legislation.

On the other requests, he emphasized that there are no specific provisions that could accommodate them in the budget but that he will find ways of assisting in some of them.

Prof. N. I. Akinwande, *FNMS*
President, NMS.

THE NIGERIAN SOCIETY FOR MATHEMATICAL BIOLOGY

The Department of Mathematics, University of Nigeria Nsukka in conjunction with Nigerian Society for Mathematical Biology (NSMB), Nigeria, has been hosting International workshops on Mathematical modeling and simulation (IWWMAS) since 2016. These workshops witnesses participants from industries, medical and Para-medical sector, engineering sector, academics, and postgraduate students.

The 3rd International Workshop and conference on Mathematical Modeling and Simulations was held at the University of Nigeria, Nsukka from 16th – 22nd September, 2018. During the 2018 workshop and conference the first three days, from 16th — 19th September, 2018, was for the workshop while the last three days from 19th – 22nd September, 2018 was for conference, where participants were able to present their research papers to variety of participants.

The areas covered in the workshop include, but not limited to

- Bio-mathematics/Epidemiological model
- Non-Epidemiological models (Cardiovascular flows)
- Analysis of models constructed
- Fluid dynamics and their models
- Basic tools and software for Graphical Analysis of models (MATLAB, MAPLE, MATIMATICA, etc)

The resource persons that featured in the 2018 workshop include:

Prof. N.I. Akinwande (FUTMINNA), Prof. G.C.E. Mbah (UNN), Dr. D. Okunghae (UNIBEN), Prof. V. Asor (MOUAU), Dr. A. Sirajo (FUTMINNA).

The practical sessions which include practical training on how to use MATLAB, MAPLE, and other softwares needed for the analysis of models were handled by Dr. T. Tivde (FUAM), Dr D. Sarki and Dr. D. Aghebaku (UNN).

During the conference the parallel sessions had presenters from different fields of Mathematics, Statistics and Computer Science.

As part of the event during the workshop and conference, **The Nigerian Society for Mathematical Biology (NSMB)** was formerly launched with her maiden executives selected from across the country. The executive council of the society include:

- Prof G. C. E. Mbah – President (University of Nigeria, Nsukka)
- MRS. D. BAKO – VICE PRESIDENT (FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA)
- Dr. A. Sirajo – Secretary (Federal University of Birnin Kebbi, Birnin Kebbi)
- Dr T. Ashezua – Assistant Secretary (Federal University of Agriculture, Markudi)
- Dr. T. Tivde - Treasurer (Federal University of Agriculture Markudi)

The **Journal of the Nigerian Society for Mathematical Biology (JNMSB)** was also launched during the conference and its maiden journal publication was given to all participants.

Membership of the society is open to all academics. Membership registration fee is N5000.

The 2019 workshop and conference come up in September. The first announcement will be made after the NMS conference holding at UNN.

Below are some of the photos taking during the event.



Photos of some resource.

From Left: Dr D. Agbebaku, Prof M. O. Oyesanya, Dr. A. Sirajo, Prof G. C. E. Mbah, Dr. T. Tivde, Prof M. O. Osilike, and Prof V. Asor.



Participants at the workshop and conference



During the opening ceremony



A cross section of participants during the practical section at the computer Lab



During the opening ceremony



Participants during the opening ceremony



Participants during the opening ceremony



Participants during the opening ceremony

OUTSTANDING PHD AWARDS



2016 (MATHEMATICAL MODELLING)

I wish to thank the Almighty God for finding me worthy of the outstanding PhD thesis award in mathematical modeling for the year 2016. I equally appreciate the Nigerian Mathematical Society (NMS) for initiating the idea of honouring their members who have excelled in their chosen field of research in the course of their PhD study.

Special appreciation goes to my PhD supervisory team at the Federal University of Technology, Minna, (FUT, Minna) Nigeria, led by my Teacher, mentor and father, Prof. N. I. Akinwande and my co-supervisors, Dr. R. O. Olayiwola and Dr. F. A. Kuta. They painstakingly went through my thesis and saw it to its logical conclusion. May the Almighty God continue to bless and keep them safe.

Many thanks to the Federal University of Agriculture, Makurdi, (FUAM) Nigeria for granting me study leave which enabled me to concentrate on my PhD research at FUT, Minna. Special thanks also go to the Department of Mathematics, Statistics & Computer Science (M/S/C), Federal University of Agriculture, Makurdi with particular mention of Prof. A. R. Kimbir and Prof. E. S. Onah. They laid a solid foundation for me in the field of mathematical modeling during my undergraduate and master's levels. May the good Lord continue to bless them all.

Finally, I sincerely appreciate my family and friends for their ceaseless prayers day and night towards my success.

Timothy Terfa Ashezua, Ph.D. (2016 Functional Modeling)
Department of Mathematics/ Statistics/ Computer Science,
Federal University of Agriculture, Makurdi, Nigeria.



2014 (FUNCTIONAL ANALYSIS)

Stretching my hands to receive the prestigious Best PhD Thesis Award from the Nigerian Mathematical Society is to date a privilege I feel unworthy of. Indeed, it is a humbling experience considering the meticulous perusal of celebrated fathers in this age-long field of study who were involved in the award process, and owing to the strong competition from equally well written theses considered. I unreservedly dedicate this prize to God and my Lord Jesus Christ, without prejudice to any other belief, for without Him nothing worthwhile can be achieved. I want to respectfully acknowledge through this medium my academic mentor, Professor J. O. Olaleru, whose indefatigable supervision largely contributed to this dream come true. I also want to singularly acknowledge Professor S. Okoya for encouraging me to submit my PhD thesis for consideration for this award.

This dream come true is a vindication of a life journey imbued with focus, passion and adventure into what I have come to embrace as a way of life – Mathematics! I look forward to many more young laureates springing forth from this prestigious body of scientists to claim national and international recognition by the merit of our work. Long live Mathematics, long live Nigeria!

Hallowed Olaoluwa, Ph.D. (2014 Functional Analysis)
Department of Mathematics, University of Lagos,
Akoka, Yaba, Lagos, Nigeria.



2016 (FUNCTIONAL ANALYSIS)

It came to me as a huge surprise as I thought my PhD was not too different from others who have conducted research in the field or as the case may be that ended up in the award of the degree of PhD. Be that as it may be, I feel excited but greatly humbled by the recognition given to me by the Nigerian Mathematical Society. It only means harder work and more appearances at NMS activities. I'm grateful to the selection committee and my fellow Mathematicians. Greater appreciation to my Supervisor, Prof. Bashir Ali.

Thank you all and God bless.

Godwin C. Ugwunnadi, Ph.D. (2016 Functional Analysis)

Department of Mathematics,

Michael Ukpara University, Abia State, Nigeria



2015 (NUMERICAL ANALYSIS)

Title of thesis: Some Seond-Derivative Linear Multistep Methods with Applications to Initial Value Problems in Ordinary Differential Equations.

Markus Samaila, Ph.D. (2015 Numerical Analysis)

Mathematical Sciences Programme

Abubakar Tafawa Balewa University, Bauchi, Nigeria.



2017 (NUMERICAL ANALYSIS)

Title of thesis: Two-Step Runge-Kutta Collocation Methods with Applications to System of Ordinary Differential Equations.

AbdulHamid M. Gazali, Ph.D. (2017 Numerical Analysis)

Mathematical Sciences Programme

Abubakar Tafawa Balewa University, Bauchi, Nigeria.



2014 (MATHEMATICAL MODELLING)

Nasir Muftau Olalekan, Ph.D. (2014 Mathematical Modelling)

Department of Mathematics,

Federal University of Technology, Minna, Nigeria.

Prof. D. G. Yakubu (Vice-President, NMS)
Chairman, Selection Committee



**PROF. SAMUEL
SEGUN OKOYA**
FMAN, FNMS

Samuel Segun Okoya earned B.Sc. (First Class Honours) from Obafemi Awolowo University (OAU) in 1983 as well as M.Sc. and Ph.D. in Mathematics from the same University under the direction of late Professor R. O. Ayeni in 1986 and 1989, respectively. Okoya began his scientific career as a Graduate Assistant and is currently professor of Mathematics. Prior to returning to OAU in 2017, he held Pastor E.A. Adeboye Endowed Professorial Chair in Mathematics of the University of Lagos, Lagos, Nigeria (2013-2017). He held Third World Academy of Sciences Associateship to visit India from 2006 – 2009 and was selected an Abdus Salam International Centre for Theoretical Physics (ICTP) Associateship from 2001 – 2006. He has subsequently been invited five times as a short time visiting Professor to ICTP.

Okoya's primary research interest is modern applied Mathematics in the broadest possible sense merging asymptotic methods, numerical techniques and mathematical analysis. He is known for his applied contributions to combustion and incompressible flow. Okoya is a member of the American Mathematical Society, the Nigerian Mathematical Society (NMS), Mathematical Association of Nigeria (MAN) and Southern African Mathematical Sciences Association (SAMSA) and is a fellow of both NMS and MAN. He served the mathematical community as a council member of the NMS via, Treasurer (2006-2011), Editor-in-Chief of the Journal of the NMS (2011 to date) and Editor, Notices of the NMS (2016 to date).

He loves teaching at all levels of the undergraduate and postgraduate curricula, reading, walking and shares life with his wife and best friend, Dr (Mrs) Aderonke A. Okoya, their three grown children, Timi, Ife, Funmbi, their partners and grandchild.

EXTRACT FROM KEYNOTE ADDRESS PRESENTED BY PROFESSOR SAMUEL S. OKOYA AT THE 38TH ANNUAL CONFERENCE OF THE NIGERIAN MATHEMATICAL SOCIETY HELD AT NSUKKA, NIGERIA FROM 18TH – 21ST JUNE, 2019

- In my opinion, the basis of all human culture is language and evidently Mathematics being a natural language is a tool of communicating essentials required for our survival and keeping our growing understanding of nature.
- I am convinced that reasoning needs to be learned and mathematics is the best way to develop the power to reason. It is not surprising that intellectually sound lawyers, brilliant actuarial practitioners, great economists and others advocate the teaching and learning of mathematical logic at the university level.
- There are many contemporary and commonly encountered everyday processes with the governing equations and /or mathematics involved. These processes are responsible for the interesting feeling of the applicability of mathematics as a bedrock for scientific and technological advancement. So, the focus of this address will be on some of the distinctions that have made the mathematics have such an influence on humanity.
- The first of these distinctive applications for impressive technological advancement is the artful mathematics of creating Rosette images and wall-paper patterns based on the mathematics of symmetry. Symmetry has long provided the needed connection between mathematics and the visual arts. The fundamental ideas needed in understanding and creating symmetric planner designs are from group theory, Fourier series, complex variables, linear algebra and geometry. There is software now that produces colour plot with great ease at www.sagemath.org/. Pictures representative of creating rosette images and wall paper patterns are as displayed.
- However, additional tools and good knowledge of chemistry are necessary for complex mathematical problems such as fuel-based combustions such as burning building, fire, smoke, explosions and ignitions etc. The development of analytical methods, semi-analytical techniques and/or algorithm for solving such equations with or without a computer is one of the corner-stones of applicable mathematics and scientific computing. The use of numerical computation has become well established in scientific and technological research over the years while the use of purely analytical approaches is on the decline because of its limitation to less complex systems.
- Another distinctive application of mathematics in Mathematical biology which is different from the applications to physics and engineering. Mathematical biology has grown to a major branch of applicable mathematics and it has created an enormous biological research community in; nephrology, neurobiology, neuroscience, pharmacology, biochemistry, environmental studies etc.



PROF. NGALLA
DJITTE

Ngalla DJITTE, Full Professor of Mathematics and Head of the Department of Applied Mathematics at Gaston Berger University, Saint Louis, Senegal; Lecturer in the Postgraduate Diploma Programme in Mathematics, International Centre for Theoretical Physics (ICTP), Trieste, Italy; Full Professor, Mathematics Institute, African University of Science and Technology (AUST), Abuja, Nigeria; earned a **Master** in Applied Mathematics from Gaston Berger University (1998), a **Postgraduate Diploma** in Pure and Applied Mathematics from The Abdus Salam International Centre for Theoretical Physics ICTP, Trieste, Italy (1999), and a **Ph. D.** in Pure and Applied Mathematics from Paris Dauphine University, Paris, France (2004). He is the Leader of the research group on Geometry of Banach Spaces, Iterative methods and Differential Inclusion based in Gaston Berger University. He mainly teaches and deploys research activity in Gaston Berger and also in the solid research Network PDEs-Modelling Control around West Africa. His research interests include Exterior Differential Calculus (EDC), Iterative Methods, Functional Analysis, Operator Theory, Optimization, Nonlinear Integral Equations of Hammerstein Type,...

S H O R T A B S T R A C T

Are we rational? From Economy to Differential Geometry through Partial Differential Equations

BY: NGALLA DJITTE

In many economic contexts, a given function can be disaggregated as a linear combination of gradients. Examples include the literature on the characterization of aggregate demand and excess demand functions (Sonnenschein 1973ab, Debreu 1974), and the model of efficient household behaviour recently proposed by Browning and Chiappori (1994). We show that exterior

differential calculus provides very useful tools to address these problems. In particular, we show, using these techniques, that any analytic vector field in R^n satisfying Walras Law can be locally decomposed as the sum of n individual, utility maximizing demand functions.



The Editor-in-Chief invites all readers, from students to retired folks, to get more involved with Notices as authors, writers of Letters/send pictures captions to the Editor, and so on:

E-mail your interests, ideas, pictures of events with captions or suggestions to noticesnms@gmail.com

www.nigerianmathematicalsociety.org



**PROF. OLUWOLE
DANIEL MAKINDE**
MFR, FAAS, FIAPS

Professor Makinde is presently a Distinguished Professor of Computational and Applied Mathematics at the Faculty of Military Science, Stellenbosch University, South Africa. He is also a visiting Professor to several other Universities, including the Vellore University of Technology in India; Nelson Mandela African Institute of Science and Technology in Tanzania; the Pan African University Institute for Basic Sciences, Technology and Innovation in Kenya; the African University of Science and Technology in Nigeria; the Adama Science and Technology University in Ethiopia, etc. He was a Full Professor & Head of Applied Mathematics Department at the University of Limpopo, South Africa (1998–2008) and Senior Professor & Director of Postgraduate Studies at the Cape Peninsula University of Technology, South Africa (2008–2013). He obtained his BSc (Hons) degree - First Class with Faculty Prize & MSc degree qualifications in Mathematics from Obafemi Awolowo University in Nigeria and PhD degree in Computational Applied Mathematics from University of Bristol in United Kingdom under the prestigious Commonwealth Scholarship. His research work covers three broad areas which include: Fluid Mechanics, Mathematical Biology, and Computational Mathematics.

Prof. Makinde won several distinctions, scholarships, fellowships, prizes, grants and awards for his outstanding contributions to Basic Science, Engineering, Technology and Innovation in Africa. He served as external examiner for Applied Mathematics programme in many

universities within and outside the African continent and delivered several invited keynote lectures at various national, regional and international conferences. He is a member of the International Association of Engineers (IAENG).

S H O R T A B S T R A C T

Mathematical Treatment of Fluid Flows and Heat Transfer in Engineering and Biological Systems

BY: O. D. MAKINDE

Faculty of Military Science, Stellenbosch University, Private Bag X2, Saldanha 7395, South Africa

Mathematical treatment of fluid flows and heat transfer is an indispensable tool for adequate understanding, design and improvement of engineering and biological systems operation. Fluid flows and heat transfer seem to pervade all aspects of our life. Almost everything experiences heating or cooling of some kind and fluids play a vital role in making life possible on earth. Enhancement of heating or cooling in engineering processes may create a saving in energy, reduce process time, raise thermal rating and lengthen the working life of equipment. Similarly, appropriate regulation of biofluid flow and heat transfer may improve prevention, treatment, preservation, and protection techniques for biological systems. Meanwhile, finding effective solution to fluid flow and heat transfer problems has remain one of the great challenges of all engineering and science. In recent time, the advent of technology and advanced computational techniques coupled with complex mathematical models has greatly enhanced the ability to analyze various types of fluid flow and heat transfer processes. In this presentation, novel concepts associated with computational modelling of fluid flows and heat transfer in engineering and

biological systems are outlined. In particular, three innovative model problems are theoretically examined, namely:

(i) Nano-Technology for Heat transfer Enhancement: Hybrid nanofluid presents a new generation of technologically advanced heat transfer fluid with a wide range of applications in engineering and industries including heat exchanger and electronics cooling.

(ii) Environmental Influence on Human Body Thermoregulation: The influence of surrounding environment on human tissue blood flow and thermoregulation is mathematically examined.

(iii) Surface Runoff and Soil Water Percolation: The biomechanics of interaction between surface runoff and soil water transport with heat transfer characteristics is mathematically investigated. The obtained results will no doubt be useful for boosting groundwater storage and soil erosion control.

Keywords: Hybrid nanofluid; Thermal boundary layer; Human body thermoregulation; Porous medium; Runoff water; Soil water percolation



**DR. CLEMENT
E. O. ONIME**

Dr. Clement E. O. ONIME is from the Information and Communication Technology Section (ICTS) of the Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy and the International Telecommunications Union (ITU), European Centre of Excellence on Internet of Things (IoT) and Big Data and Statistics. He holds a PhD degree from the Ulster University (U.K) for work on Mixed Augmented and Virtual Reality, while his M.Sc. and B.Sc. (First Class Hons.) are from the Obafemi Awolowo University (Nigeria).

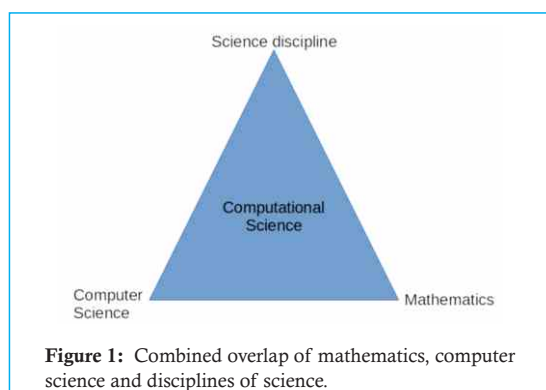
He is a visiting Associate Professor to the Computer Science Department of the African University of Science and Technology and the Computational Science Graduate Studies Programme of the Addis Ababa University, Ethiopia and as well as a visiting scholar to both University of Lagos and the University of Ibadan. His research areas include Biometric Technology, Internet of Things, Data Science, Big Data Analytics, Machine Learning, Artificial Neural Networks, Mobile Computing, mixed/Augmented Reality systems, High Performance Computing, Computer Networking, Cloud Computing, Information Systems, Internet resources & services, Green Computing, engineering education: e-learning+ virtual and remote labs, mathematical modeling for engineering and radio/satellite and digital communications systems.

S H O R T A B S T R A C T

Mathematics and Computational Science for academic and national development

BY: CLEMENT ONIME

The last 2 decades have witnessed a remarkable growth internationally of computational science as an inter-disciplinary field. Indeed many of the recent scientific discoveries were made possible thanks to Computational Science. This article introduces the fundamental role the application of mathematics plays in computational science and how this may be harnessed for academic and national development.



Computational Science as shown in Figure 1 is created from the combined overlap between mathematics, computer science and other disciplines of science such as Physics, Chemistry and Biology, however, now-a-days, this also includes non-natural science disciplines.

Broadly speaking computational science involves the use of computers to solve scientific problems. The process starts with the development of a mathematical model of the problem under study using equations (the PDE are commonly used). These models are then transformed using

algorithms to numerical equivalents that are subsequently coded as computer software which when executed provide numerical outputs as solutions. In summary, Computational science is about a scientific approach to transforming scientific problems to numerical equivalents for solving computationally.

Mathematics plays a vital role in all aspects of computational science, starting from the modelling of the problem using equations; to transformation using algorithms; to optimisation and determination of errors during software development and execution as well as finally translating/relating the numerical solution back to the original problem domain.

Going by the examples from many nations, mathematics within Computational Science is now used extensively within global processes of national development such as inventing, implementing or improving, testing and interpretation of results

Mathematicians can help to improve academic standards in the Sciences and also national development by promoting and contributing to inter-disciplinary research work and initiatives as part of the steps towards competitive industrialisation in Africa.

Editor's note: It is on record that Dr Onime facilitated the hosting of the Journal of the Nigerian Mathematical Society (JNMS) at the Open Journal System (OJS) of the Abdus Salam ICTP. His team also provides IT support. These services are at no cost to our Society. The Editorial Board of JNMS and the entire members of the society are grateful.

PASTOR E. A. ADEBOYE PROFESSORIAL CHAIR OF MATHEMATICS AT UNIVERSITY OF NIGERIA, NSUKKA

We are very pleased to bring to the notice of Mathematical Sciences Community and the general public the existence of the Professorial Chair of Mathematics endowed by Pastor E.A. Adeboye at the University of Nigeria, Nsukka, Nigeria. Although the endowment was made in 2011, it is the enthusiasm of the current Vice-Chancellor, Professor Benjamin C. Ozumba that activated the Chair in 2016. The advert for the appointment of the pioneer occupant of the Professorial Chair by the University was made in Guardian Newspaper of Thursday August 11, 2016. After a successful interview on October 28, 2016, I was appointed the pioneer occupant of the Chair with effect from December 1, 2016 via a letter VC/A/18 of November 30, 2016.

As a pioneer occupant of the Chair, the initial goal was to get an office for the Chair and make it functional. Department of Mathematics, UNN provided the offices at the J.O.C. Ezeilo (ABUJA) Building where the Department is located. Rooms 305, 306 and 308 were provided for the Chair Occupant, the Secretary and the technical staff respectively. The offices have also an adjoining toilet facility in room 304. The allocation of the offices to the Chair was formalized by a letter from the DVC (Adm). The sum of over 7.5 million Naira had been spent by the University on furniture, office equipment, and computer facilities for the Offices. This excludes the sum of over three hundred thousand Naira used in giving the offices facelift and providing burglar proofs.

Pictures of the offices of the Chair, the Secretary and the corridor/entrance are pasted below. Fundamental activities are going on in the Office of the Endowed Chair.

In 2019 Session, the occupant of the Chair in consultation with the Department of Mathematics, the Fixed Point Theory and Applications Research Group (FPTA-RG),

UNN and other research collaborators are planning among other activities the following:

1. **Organization of Conference and Workshops aimed at re-training and up-dating secondary school teachers on the current Senior School Mathematics Syllabus**

This will also involve career talk to Secondary School Students; emphasizing the relevance of Mathematics in all discipline and providing therapy for Mathematics phobia (defusing the phobia associated with Mathematics).

2. **Two days Seminar to improve awareness on the existence of the Chair, current activities of the Chair and prospects**

3. **Participation in the 38th Annual Conference of the Nigerian Mathematical Society**

This Conference is scheduled here in the Department of Mathematics, UNN during the period June 18 - 21, 2019. The occupant of the Chair will actively participate in the Conference and will be pleased to facilitate the participation of some graduate students in the Department of Mathematics, UNN. Facilities of the Office will be available for the Conference

4. **Organization of intermittent postgraduate research-oriented seminar/workshops aimed at enhancing postgraduate students in which experts in relevant areas are to be hired to deliver relevant lectures**

5. **We will also Collaborate with the Simulation and Modeling Association of Nigeria and Department of Mathematics of UNN to host the 4th International Workshop and Conference on Pure and Applied Mathematics in September 2019.**

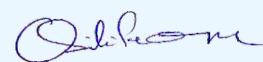


Fig 1: Corridor/Entrance to the Chair Office

Fig 2: Main Office of the Chair

Fig 3: Routine Research Activities in the Office of the Chair

Fig 4: Office of the Secretary to the Chair



Professor M.O. Osilike, FNMS, FAS
Chair Occupant at UNN

INTERVIEW WITH DR. FOLASADE B. AGUSTO

Conducted by Prof. Samuel S. Okoya



S. S. Okoya: *Can we briefly meet you?*

F. B. Agosto: I am Dr. Folashade Agosto. I am from Lagos Island, but I grew up on the mainland. I finished from St. Timothy's College, Onike Iwaya. I studied Applied Mathematics from Ladoke Akintola University of Technology (LAUTECH), Ogbomosho and I have a masters and Ph.D. degrees in Mathematics from the University of Ilorin (Unilorin). I did postdoctoral research work at the National Institute for Mathematical and Biological Synthesis (NIMBioS), Knoxville, Tennessee. I am currently based in the United States of America in the Department of Ecology and Evolutionary Biology at The University of Kansas.

S. S. Okoya: *When and how did you know you wanted to be a Mathematician?*

F. B. Agosto: My undergraduate degree was in mathematics from LAUTECH. I was one of the 650 pioneering students of the University at her inception in 1990. Before then, I wanted to study Computer Science; so, I went on to have a post-graduate diploma in Computer Science from Unilorin. However, after this diploma, I changed my mind to continue with applied mathematics, and I am happy about that decision.

S. S. Okoya: *Who encouraged or inspired you (mathematically or otherwise)?*

F. B. Agosto: My postdoc mentor, Prof. Suzanne Lenhart, is a great source of inspiration to me. I admire her a lot. She's a very smart

and hardworking person; She's very supportive of folks around her. I find it amazing that she is able to contribute to science while having a lot of collaborators and students.

S. S. Okoya: *What obstacles or challenges did you encounter before you travelled abroad, and how did you handle them?*

F. B. Agosto: One of my greatest challenges was working in an environment where folks were not supportive of junior faculties; an environment where senior colleagues feel threatened by my desire to seek knowledge and improve myself. The other big

I also know and believe that being a woman does not make me weak or dumb and that there is nothing that is impossible for me to do if I work hard and have the support of my God.

challenge I faced was sexual harassment from authority figures. I know this is something that we don't discuss in the country. We need to protect female students from these predatory figures. A professor once told me that no female would have a Ph.D. in mathematics or physics without sleeping with her advisor; I got mine with lots of hard work, and I didn't sleep with my advisor who is a disciplined man and Christian. Furthermore, I was able to overcome these challenges by the grace of God and the support of

my family. I believed in myself, and I worked very hard so that no one aside from God can lay claim to how far I would go or have come in my life and career. I also know and believe that being a woman does not make me weak or dumb and that there is nothing that is impossible for me to do if I work hard and have the support of my God. My slogan or motto is "there is nothing material a man can give me that I cannot buy for myself if I work hard, it may take a while, but I will get it".

S. S. Okoya: *What was your career trajectory? How did you get connected with the University of Kansas, Lawrence, Kansas United States?*

F. B. Agosto: After my first degree at LAUTECH, I came back to my alma mater as a graduate assistant. I later moved to the Federal University of Technology Akure (FUTA) after my masters. I remained at FUTA till I went to the States for my postdoc at the National Institute of Mathematics and Biological Synthesis (NIMBioS) at the University of Tennessee. I would have come back to country and FUTA after my postdoc, but I had to resign my appointment when my head of department at FUTA refused to extend my postdoc for one more year (12 calendar months). I could no longer bear the toxic environment in the department towards me; so, I decided to take my chances in an environment that

encourages and support scholastic curiosity and appetite. After my postdoc, I got a faculty position in the Department of Mathematics at Austin Peay State University, Clarksville, Tennessee, in the States. In 2014 I was invited to apply for a position at my current University, and I got the position after a semester as a Langston Hughes Fellow.

S. S. Okoya: *How would you describe your research area to a mathematics graduate student?*

F. B. Agosto: My research is at the interface of mathematics and biology. I study using mathematical models of biological systems involving human, animal, and plants infectious diseases. I have mostly developed models for vector-borne diseases, but I have also studied disease such as Ebola, and meningitis in Nigeria. I am interested in addressing questions involving conditions for disease risk mitigation. How can we optimally mitigate against these risks? I am also interested in the evolution of host/pathogen interactions. How pathogen optimally utilizes certain traits to ensure its survival.

S. S. Okoya: *Do you teach? What type of courses do you teach?*

F. B. Agosto: Yes, I teach. One of the courses I teach is a course I developed on modeling in mathematical epidemiology. This course is geared at helping the students to develop different disease models according to the natural history of the infection in the hosts. And how to determine the conditions for disease persistence or elimination.

Aside from this course, I also teach Biostatistics for biology majors.

The course cater to the statistical needs of our students.

When I was in the mathematics department, I had taught calculus, differential equations, and applied mathematics.

S. S. Okoya: *Do you have a professional support network? How did you make connections with the support system or community?*

F. B. Agosto: I am not sure I understand the question. But if you mean, do I have research collaborators. The answer is yes. I have collaborated with a diverse range of scientist from Biologist to Entomologist to Veterinarian. These collaborations usually form from attending conferences, and workshop symposia. Of course, they don't happen overnight; they take time. One of the rules is to ensure you give some form of presentation in a meeting, be it talk or a poster presentation.

S. S. Okoya: *What skills that you acquired at the undergraduate level that have been applied in your current research work?*

F. B. Agosto: As an undergraduate, I picked up some programming skills and some numerical analysis skills. However, at this stage of my career, I did not exactly pick up a definitive skill other than these because the undergraduate mathematics level is where you start learning actual mathematics. It's at this stage that you start developing your character and ethics to work and life. Being the first set of Lautech, we were taught a lot, most importantly, we were taught to work hard and to persevere. Most of the mathematics I know today, was learnt as an undergrad. It was not fun when we were going through

it, but that training stays with you for the rest of your life. However, it was at this stage that I learnt to be

...seek knowledge; knowledge they say is power. Life is an endless college; you learn at every turn. You may know folks that will get you through open doors, but knowledge ensures you remain within those doors.

an independent researcher, only checking in on my undergraduate advisor to report my progress rather than having him validate every step I take. For my undergraduate thesis, I went far, and beyond what I learnt in class given the constraints we had back then as the first set of the university. Above it all, I learnt to think, and trouble shoot problems myself. This is something I still do today in my research work and collaborations with other scientists.

S. S. Okoya: *What are your hobbies?*

F. B. Agosto: I love hiking in the woods to see and appreciate nature, and living in the States has availed me of this pleasure. This is something that, sadly, is gone from my home town of Lagos. A lot of Nigeria's forest area is fast disappearing, and no one seems to care.

S. S. Okoya: *How do you balance career and outside interests?*

F. B. Agosto: I want to believe that by outside interest, you mean family life? This is a hard question that a lot of folks are seeking

answers to. I do not know. I guess one should try to ensure balance and not let one outweigh the other. Both bring different kinds of joy and fulfillment. However, one can be complete with both, either one or none.

S. S. Okoya: *What advice or word of wisdom do you have for current graduate students?*

F. B. Agosto: My advice to the grad students is that they should be honest in all they do; they should work hard and ensure they are independent as much as possible. Nobody wants to work with someone that is dependent and needs validation at every step. They should always remain humble. Also, they should seek knowledge; knowledge they say is power. Life is an endless college; you learn at every turn. You may know folks that will get you through open doors, but knowledge ensures you remain within those doors. As Prof Chidume once said, you are not competing among yourselves (say OAU vs. Lautech), you are competing with that graduate student in Ivy Leagues such as Harvard, and Princeton. Therefore, aim to be better than the Ivy Leaguers. Lastly, persevere; see every phase as a learning phase.

S. S. Okoya: *If you could recommend one book to mathematical biology graduate students, what would it be?*

F. B. Agosto: In my epidemiological modeling class, I use the book by Matt J. Keeling and Pejman Rohani on Modeling Infectious Diseases in Humans and Animals. This book explains the basic concept of disease

modeling; unfortunately, it does not go into concrete mathematical details of these models. Another thing I like about the book is the availability of computer codes such as Matlab, C++, and Fortran for some of the models discussed.

S. S. Okoya: *What should a mathematics graduate student do if they want to learn more about your work or want to be more involved in mathematical modeling approaches for advancing conservation, ecology, and epidemiology?*

F. B. Agosto: They should make sure they understand their differential equations, ordinary and partial differential equations. They should ground themselves in the theory behind these equations and analysis (real and functional analysis). They should understand and have some basic programming skills in languages like C, C++, Python, R, etc. Some understanding of ecology or biology will be great. So, it won't hurt to take some ecology or biology classes or sit in an ecology or biology class. Lastly, they should have a passion for real hard work.

S. S. Okoya: *What is something people might be surprised to learn about you?*

F. B. Agosto: Folks might be surprised to know that at one point in time, I had wanted to be an actress and still do. I joined a drama troupe for a year before going to college. During my service year, I was part of the Kaduna State drama troupe. I was a faculty advisor for a drama group in Lautech.

S. S. Okoya: *Any final comments or advice?*

F. B. Agosto: I have two pieces of advice. My first advice is to all the senior colleagues (associate and professors) out there. Encourage and support your junior faculties; it's best to make disciples of people. Furthermore, a lot of us outside the country want to come home to give back, to help develop and improve the educational situation that we see are deteriorating due to the numerous strikes. I am for the improvement of the lives of the faculties as I am for the educational standard. Please help us to give back; we are not interested in your jobs or positions.

My final advice is to the female students out there. You are more than able, believe in yourself. If you have come this far in your career (secondary school, undergraduate and now graduate studies), there is nothing you cannot do. More so, you are studying and doing the same science as any man. You are not doing a female version of mathematics or science; there is no such thing. You will go home with the same degree as your male counterpart. This is why I do not attach gender or marital status to my academic title. So, don't let any man intimidate you, bully you, or make you feel irrelevant. Stand up for yourself, and if you have to fight, fight. Lastly, if someone is sexually harassing you, report it. We are in the "me too" era. Nigerian Universities need to protect our girls, but this cannot happen if you do not voice out.



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He qualified as a Fellow of the Institute of Actuaries (FIA) of England in July, 1973. In 1974, he became a Fellow of the Royal Statistical Society of England (FRSS). Chief Ogunshola has been a Fellow of the Institute of Directors since 2004, Fellow of the Nigerian Institute of Public Relations (FNIPR), 1998. He was invested as a Fellow of the Nigerian Mathematical Society (FNMS) in 2016.

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