EDITORIAL

FCAA RELATED NEWS, EVENTS AND BOOKS (FCAA–VOLUME 22–5–2019)

Virginia Kiryakova

Dear readers,

in the Editorial Notes we announce news for our journal, anniversaries, information on international meetings, events, new books, etc. related to the *FCAA* (“Fractional Calculus and Applied Analysis”) areas. All these Notes are published online with free open access.

1. Bulgarian Academy of Sciences – Celebrating 150 years

<http://www.bas.bg/en/150-bas/>,
https://en.wikipedia.org/wiki/Bulgarian_Academy_of_Sciences

The founding publisher (1998 – 2010) of the journal “*Fract. Calc. Appl. Anal.*” is Institute of Mathematics and Informatics of Bulgarian Academy of Sciences (IMI – BAS). As Ed.-in-Chief, I am honored to provide readers with a piece of information about Academy’s history, on occasion of its *150 years’ Anniversary*.

Established in 1869, the Bulgarian Academy of Sciences is the oldest institution in modern Bulgaria. It carries out scientific work in accordance with the universal values, national traditions and interests. The BAS, as successor of the Bulgarian Learned Society (BLS), is the oldest and largest scientific institution in the country, *founded nine years before the restoration of Bulgarian state (1978, liberation from Turkish dominance)*. The creation of the Bulgarian Learned Society by individuals who did not yet have their state required great faith and much hope and marked one of the peak events of the Bulgarian Revival.

Among the founders of the Bulgarian Learned Society in 1869, in Braila - Romania, there were prominent figures of the Bulgarian Revival such as Marin Drinov (Professor at Kharkov University), Vasil Drumev (later Prime Minister of the Principality of Bulgaria and Metropolitan of Tarnovo), Gavril Krustevich (Governor of Eastern Rumelia). This historical act of Bulgaria was a deed of various strata of society: from established names in science to the Apostle of Freedom, Vassil Levski, who was also among its

founders and first donors. The highly patriotic spirit of the Bulgarian people stood out particularly vivid in the strong public support that made the Society a unifying symbol of the nation. The founders showed great vision with regard to the administration and the legal framework of the institution by taking care to adopt a Statute and publish the official magazine: the Periodical journal of BLS. At the same time, the collecting of a book and a documentary fund, preserved to this day at the Central Library and Archives of BAS, began.

“At this place (Braila, Romania) it was the house where in 1869 Bulgarian emigrants put the bases of the future Bulgarian Academy of Sciences”

The European prestige of the Society was also raised by European capacities such as Konstantin Jireček, Minister of National Enlightenment and Professor at the University of Vienna. The builders of modern Bulgaria did not forget to allocate funds for the moving of BLS from Braila to the newly liberated Principality. The rise of its scientific status, however, was mostly related to the name of the longest-running chairman, Ivan Evstratiev Geshov, prominent banker, politician and public figure and generous donor of the institution. Owing to his efforts and the attitudes of society, *in 1911 the society grew into the Bulgarian Academy of Sciences*. BAS played an important role in establishing the young Bulgarian state in the Balkans and in Europe.

After the Second World War, the Academy gradually grew, becoming a poly-structural research institution. Beyond the old focus on fundamental scientific research, the applied and exact sciences began to excel which in the previous decades had been developing mainly in university circles. Thus, its social commitment was meeting the needs of the new, planned economy and the increased economic opportunities of the country. During this period, a number of pioneering developments were carried out at the institutes of the Bulgarian Academy of Sciences in different areas which provided the country a significant place on the world technological map. It is enough to mention the birth, in the Academy, of such activities and fields as: the electronic industry of Bulgaria, nuclear energetics, robotics, space research, development of nanomaterials and new technologies, biomedicine and a number of others. Especially, in IMI-BAS (former Mathematical Institute with Computing Center), along with development of theoretical trends then covering all main topics in AMS Mathematics Subject Classification, there were constructed and launched one of the first in World electronic calculators (1965, ELKA-22, after these in UK and Japan), and the prototype of the first Bulgarian Electronic Programmable Computer (1961). All this helped to raise the fundamental and applied research of the scientists from the BAS at the world level.

Nowadays, the Bulgarian Academy of Sciences is the largest scientific institution in Bulgaria with proven international authority. It embodies both the traditions of the past and the challenge of the country on the path of its European integration. Inseparably connected with the state, BAS is both a scientific and a public organization – an organic part of the spiritual development of the Bulgarian nation. In this jubilee year, the Academy continues to work for its mission: “to conduct research in accordance with universal values, national traditions and interests, to participate in the development of world science, to study and to multiply the material and intangible cultural and historical heritage of the nation”.

2. Reports on Some FC Related Meetings in 2019

“FCPNLO – 7” Workshop

From sub-diffusion to the wave equation:

Analysis, models and computation

(26-28 September 2019, University of Sussex, Brighton, UK)

Website: <http://www.sussex.ac.uk/maths/research/fcpnlo-7>

This workshop is the seventh meeting in the series of Fractional Calculus, Probability and Non-Local Operators: Applications and Recent Developments held at BCAM, Bilbao, Spain in 2013, 2014, 2015, 2016, 2017 and 2018. The workshop was supported by EU Horizon 2020 Marie Skłodowska-Curie project “ModCompShock”. This project has received funding from the European Union’s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 642768.

There were about 30 participants at the Workshop. The following speakers were invited to give presentations:

– Mark Ainsworth (Brown University); – Lehel Banjai (Heriot Watt University); – Adrian Baule (Queen Mary University of London); – Zdzisław Brzezniak (University of York); – Sergey Fedotov (University of Manchester); – Rainer Klages (Queen Mary University of London); – Vassili Kolokoltsov (Warwick University); – Virginia Kiryakova (Institute of Mathematics and Informatics, Bulgarian Academy of Sciences); – Krzysztof Łatuszynski (Warwick University); – Elżbieta Motyl (University of Łódź); – Gianni Pagnini (BCAM).

During the meeting, the participants were happy to congratulate Prof. Vassili Kolokoltsov on occasion of his 60th Anniversary. Recently he became a new member of Editorial Board of *Fract. Calc. Appl. Anal.*. His main research interests and contributions are in probability and stochastic processes, mathematical physics, differential equations and analysis, optimization and games with applications to business, including *fractional order models*, etc. More details on his personality and contributions can be found at:

<https://warwick.ac.uk/fac/sci/statistics/staff/academic-research/kolokoltsov>.

The full program, abstracts and list of participants are available at:

<https://www.sussex.ac.uk/webteam/gateway/file.php?name=titles-abstracts.pdf&site=31>,
<https://sites.google.com/view/lfo12-13aprile2019/poster-session>.

On behalf of Organizers,

Jozsef Lörinczi, Charalambos Makridakis, Enrico Scalas

3. Calendar of Coming FC Related Meetings in 2020

**“National Seminar in Applied Statistics and
Symposium on Stochastic Modelling”**

Feb. 4-6, 2020, St. Thomas College, Thrissur, Kerala, India

The PG & Research Department of Statistics and B. Voc Data Science, St. Thomas College, Thrissur, Kerala - India, is organizing this event as part of Centenary Celebrations of the College and *85th Birth Anniversary of Prof. A.M. Mathai*. It will be our great pleasure if you could bless the conference with your esteemed presence.

On behalf of Organizers, and for Correspondance:

Dr. Nicy Sebastian, Dept. of Statistics, St. Thomas College, Thrissur

Contacts: nicycms@gmail.com, seminarstcctr2020@gmail.com

**“SIAM Conference on Mathematical Aspects
of Materials Science”**

May 18-22, 2020, Bilbao, Spain

Website: <https://wp.bcamath.org/siamms20/>

Since 1994, every 2 to 4 years the SIAM Materials Activity Group organizes the SIAM Conference on Mathematical Aspects of Materials Science. This conference focuses on interdisciplinary approaches that bridge mathematical and computational methods to the science and engineering of materials. The conference provides a forum to highlight significant advances as well as critical or promising challenges in mathematics and materials science and engineering. In keeping with tradition, the conference seeks diversity in people, disciplines, methods, theory, and applications. For Focus themes, see at the website.

Expected Minisymposium “*Fractional Order Operators and Their Applications in Material Science*”.

**SIGNAL 2020, The Fifth International Conference
on Advances in Signal, Image and Video Processing**

May 24-29, 2020, Venice, Italy

Website:

<https://www.iaria.org/conferences2020/SIGNAL20.html>

Special track: FSS (Fractional Signals and Systems)

The main objective of this track is to put people from both sides discussing and understanding the other side view. Topics include, but not limited to: – Continuous and discrete derivative definitions; – Fractional

systems modeling and identification; – Filter design; — Fractional electrical circuits; – New fractional devices for signal processing.

Important (updated) Deadlines: – Submission: March 31, 2020; – Notification: April 19, 2020; – Registration: April 29, 2020; – Camera ready: April 29, 2020.

For deadlines, contributions types, paper format, paper submissions, planned publications, registration, see at website.

Chair and Coordinator:

Prof. Manuel Ortigueira, Center of Technology and Systems of UNINOVA Caparica, Portugal; Contacts: mdo@fct.unl.pt

NSFDE&A’20, International Workshop
“Numerical Solution of Fractional Differential Equations
and Applications”
June 8-13, 2020, Sozopol, Bulgaria
1st Announce at: [http://parallel.bas.bg/Conferences/](http://parallel.bas.bg/Conferences/NSFDE&A_2020-Sozopol.pdf)
NSFDE&A_2020-Sozopol.pdf

The workshop is organized by the Institute of Information and Communication Technologies - Bulgarian Academy of Sciences, in cooperation with the Bulgarian Section of SIAM, and the Center of Excellence on Informatics and ICT, <http://www.iict.bas.bg/EN/index.html>, <http://ict.acad.bg/>.

The NSFDE&A’20 will be held in Sozopol (ancient Apolonia), a picturesque town on the Black Sea coast, 33 km to the south from Bourgas. The Bourgas International Airport is less than 50 km to the north from Sozopol.

Aims: The workshop follows the great success of Special Session “Fractional Diffusion Problems: Numerical Methods, Algorithms and Applications” organized within the scientific program of the 12th International Conference on Large-Scale Scientific Computations (LSSC’19), June 10-14, 2019, Sozopol, Bulgaria. The workshop is aimed to start a new chain of NSFDE&A events to be organized biannually, every even year, complementary to the well-established LSSC conferences every odd year.

Scope: Specific topics of interest (but not limited to) are the following: (i) fractional in space diffusion problems; (ii) fractional in time problems; (iii) problems involving p-Laplacian; (iv) coupled problems; (v) phase separation and image segmentation; (vi) parallel algorithms and HPC tools; (vii) applications in science and engineering.

Extended Abstracts/Short Communications: The extended abstracts/short communications (up to 3 pages) are to be written in standard LaTeX and sent to: nsfdea20@parallel.bas.bg. The proceedings will be available before starting the workshop.

Workshop Fee: Covers the proceedings of extended abstracts/short communications, the workshop materials, the coffee breaks, the reception and the official dinner. Before May 8, 2020: EUR 130, after May 8, 2020: EUR 150.

On the Announce (the provided link) there are details for hotels accommodation, transportation, social program and Deadlines: – Registration / Intention to participate: Jan. 31, 2020; – Submission of abstracts: Feb. 15, 2020; – Notification of acceptance: March 1, 2020.

Chairman: Prof. Svetozar Margenov;

Secretary: Silvia Grozdanova, e-mail: nsfdea20@parallel.bas.bg

**International Conference “Mathematical Analysis
and Applications in Science and Engineering”**

July 20-24, 2020, ISEP, Porto, Portugal

Website: <https://www.isep.ipp.pt/Page/ViewPage/ICMASC>

The conference will take place at the beautiful city of Porto, at Instituto Superior de Engenharia do Porto (ISEP).

Main topics will include: – Ordinary and Partial Differential Equations: Theory and Applications; – Mathematical Modelling involving time fractional ODEs and PDEs; – Integral Equations and Integral Transforms; – Uncertainty Quantification in Mathematical Modelling; – Control Theory, Optimization and their Applications; – Probability, Statistics and Numerical Analysis; – Inverse Problems: Modelling and Simulation; – Computational Methods in Sciences and Engineering; – *Fractional Dynamic Systems and Applications*; – *Fractional Signals and Systems*; – *Singularities Analysis and Integral Representations for Fractional Differential Systems*; – *Special Functions Related to Fractional Calculus*; – Applications in Biological Systems and Cancer Dynamics; – Applications to Electrical Engineering, Electronics, Electromagnetism, Electrochemistry, Finance and Economics, *Fractional Earth Science*, Image Processing, Robotics, Automatic Control, Mechanics, Viscoelasticity, Thermal Engineering; – *History of Fractional Calculus*, etc.

For Important dates, Plenary speakers, Call for papers, Special sessions, Committees, Registration, More information, see at the website. Contacts: icmasc@isep.ipp.pt

On behalf of Organizers,

Chair of the Conference: J.A. Tenreiro Machado (ISEP, Portugal);

Chairs of Scientific Committee: Dumitru Baleanu (Romania), Juan J. Nieto (Spain), Ruy M Ribeiro (Los Alamos, USA); Chair of Organizing Committee: Carla MA Pinto (ISEP, Portugal)

**ICFDA 2020: International Conference
on Fractional Differentiation and its Applications
September-October, 2020, Lodz, Poland**

Dear colleagues, we are pleased to invite you to the International Conference on Fractional Differentiation and its Applications that will take place in Lodz (Poland) in September / October, 2020. Additional information will follow ASAP.

On behalf of Polish Conference Organizers,
Prof. Piotr Ostalczyk

4. New Books

Ivo Petrás (Ed.), *Fractional Order Systems*. MDPI Books; October 2019, 114 pp. (Printed Ed. of Special Issue publ. in *Mathematics*), ISBN 978-3-03921-608-6 (Pbk) ISBN 978-3-03921-609-3 (PDF)1;
<https://doi.org/10.3390/books978-3-03921-609-3>.

Details and Open Access:

<https://www.mdpi.com/books/pdfview/book/1757>

Description: This book is focused on fractional order systems. Historically, fractional calculus has been recognized since the inception of regular calculus, with the first written reference dated in September 1695 in a letter from Leibniz to L'Hospital. Nowadays, fractional calculus has a wide area of applications in areas such as physics, chemistry, bioengineering, chaos theory, control systems engineering, and many others. In all those applications, we deal with fractional order systems in general. Moreover, fractional calculus plays an important role even in complex systems and therefore allows us to develop better descriptions of real-world phenomena. On that basis, fractional order systems are ubiquitous, as the whole real world around us is fractional. Due to this reason, it is urgent to consider almost all systems as fractional order systems. This Special Issue explores applications of such systems to control, synchronization, and various mathematical models, as for instance, MRI, long memory process, diffusion.

Contents: The book includes Preface and Contributions to the area by the following authors: – Ivo Petrás and Ján Terpák; – Inés Tejado, Blas M. Vinagre, José Emilio Traver, Javier Prieto-Arranz and Cristina Nuevo-Gallardo; – Tomas Skovranek, Vladimir Despotovic; – Bohdan Datsko, Igor Podlubny and Yuriy Povstenko; – Richard L. Magin, Hamid Karani, Shuhong Wang and Yingjie Liang; – Xudong Hai, Guojian Ren, Yongguang Yu and Conghui Xu; – Jiamin Wei, YangQuan Chen, Yongguang Yu and Yuquan Chen.

Changpin Li and Min Cai, *Theory and Numerical Approximations of Fractional Integrals and Derivatives*. SIAM, 2019, 312 + xiv pp., ISBN: 978-1-61197-587-1.

Details:

<https://my.siam.org/Store/Product/viewproduct/?ProductId=31173135>

Description: Due to its ubiquity across a variety of fields in science and engineering, fractional calculus has gained momentum in industry and academia. While a number of books and papers introduce either fractional calculus or numerical approximations, no current literature provides a comprehensive collection of both topics. This monograph introduces fundamental information on fractional calculus and provides a detailed treatment of existing numerical approximations.

This book: – presents an inclusive review of fractional calculus in terms of theory and numerical methods; – systematically examines almost all existing numerical approximations for fractional integrals and derivatives; – considers the relationship between the fractional Laplacian and the Riesz derivative, a key component absent from other related texts; and – highlights recent developments, including the authors' own research and results.

Keywords: Fractional integral, fractional derivative, fractional Laplacian, numerical fractional integration, numerical fractional differentiation

Audience: The book's core audience spans several fractional communities, including those interested in fractional partial differential equations, the fractional Laplacian, and applied and computational mathematics. Advanced undergraduate and graduate students will find the material suitable as a primary or supplementary resource for their studies.

Keywords: Fractional integral, fractional derivative, fractional Laplacian, numerical fractional integration, numerical fractional differentiation

For Contents (7 Chapters), List of Figures, List of Tables, Preface, Index, see at provided link.

Jean-Claude Trigeassou, Nezha Maamri, *Analysis, Modeling, and Stability of Fractional Order Differential Systems 1: The Infinite State Approach*, August 2019, 316 pp., ISBN: 9781786302694; *Analysis, Modeling, and Stability of Fractional Order Differential Systems 2: The Infinite State Approach*, January 2020, 426 pp., ISBN: 978-1-786-30455-1. ISTE, London and J. Wiley.

Details: <http://www.iste.co.uk/book.php?id=1516>,

<http://www.iste.co.uk/book.php?id=1571>

Description: This book introduces an original fractional calculus methodology (the infinite state approach) which is applied to the modeling of fractional order differential equations (FDEs) and systems (FDSs). Its

modeling is based on the frequency distributed fractional integrator, while the resulting model corresponds to an integer order and infinite dimension state space representation. This original modeling allows the theoretical concepts of integer order systems to be generalized to fractional systems, with a particular emphasis on a convolution formulation. With this approach, fundamental issues such as system state interpretation and system initialization - long considered to be major theoretical pitfalls - have been solved easily. Although originally introduced for numerical simulation and identification of FDEs, this approach also provides original solutions to many problems such as the initial conditions of fractional derivatives, the uniqueness of FDS transients, formulation of analytical transients, fractional differentiation of functions, state observation and control, definition of fractional energy, and Lyapunov stability analysis of linear and nonlinear fractional order systems. This second volume focuses on the initialization, observation and control of the distributed state, followed by stability analysis of fractional differential systems.

Contents, Vol. 1: 1. The Fractional Integrator; 2. Frequency Approach to the Synthesis of the Fractional Integrator. 3. Comparison of Two Simulation Techniques. 4. Fractional Modeling of the Diffusive Interface. 5. Modeling of Physical Systems with Fractional Models: an Illustrative Example. 6. The Distributed Model of the Fractional Integrator. 7. Modeling of FDEs and FDSs. 8. Fractional Differentiation. 9. Analytical Expressions of FDS Transients. 10. Infinite State and Fractional Differentiation of Functions.

Contents, Vol. 2: Part 1. Initialization, State Observation and Control: 1. Initialization of Fractional Order Systems. 2. Observability and Controllability of FDEs/FDSs. 3. Improved Initialization of Fractional Order Systems. 4. State Control of Fractional Differential Systems. 5. Fractional Model-based Control of the Diffusive RC Line; . Part 2. Stability of Fractional Differential Equations and Systems: 6. Stability of Linear FDEs Using the Nyquist Criterion. 7. Fractional Energy. 8. Lyapunov Stability of Commensurate Order Fractional Systems. 9. Lyapunov Stability of Non-commensurate Order Fractional Systems. 10. An Introduction to the Lyapunov Stability of Nonlinear Fractional Order Systems.

*Virginia Kiryakova, Institute of Mathematics and Informatics
Bulgarian Academy of Sciences, Acad. G. Bontchev Str., Block 8
Sofia 1113 – BULGARIA, e-mail: virginia@diogenes.bg*

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