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EDITORIAL

FCAA RELATED NEWS, EVENTS AND BOOKS (FCAA–VOLUME 17–1–2014)

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Dear readers,

in the Editorial Notes we announce some important news for our journal, information on international meetings, events, new books, etc. related to the FCAA (Fractional Calculus and Applied Analysis) areas.

1. Reminders on Forthcoming Meetings Related to FC

"International Conference on Fractional Differentiation and Its Applications' 14" (ICFDA' 14) June 23-25, 2014, Catania, Italy Website http://www.icfda14.dieei.unict.it/

Extended deadlines: Regular and invited paper submission (Abstracts, 2p or IEEE Full Papers, max 6p): December 16, 2013 (up to first days of Jan.'14); Notification of acceptance: March 5, 2014; Early registration: April 10, 2014; Final submission (Paper for IEEE Proc.): April 10, 2014.

Along with the Conference IEEE Proceedings, the authors will have chance to submit unpublished papers to special / topical issues of the following journals: – "*Fractional Calculus and Applied Analysis*", ISSNp 1311-0454, ISSNe 1314-2224, by Versita and Springer, SCIE and Scopus indexed; – "*Journal of Applied Nonlinear Dynamics*", ISSNp 2164-6457, ISSNe 2164-6473, by L & H Scientific Publishing; – "*Discontinuity, Nonlinearity, and Complexity*" ISSNp 2164-6376, ISSNe 2164-6414, by L & H Scientific Publishing.

Instructions to Authors: www.icfda14.dieei.unict.it/authorinfo.html.

7th Minisymposium "Transform Methods and Special Functions" (TMSF '14) in frames of "Mathematics Days in Sofia" (MDS 2014) July 6 – 10, 2014, Sofia, Bulgaria Tentative, http://www.math.bas.bg/∼tmsf/2014/

The Institute of Mathematics and Informatics (IMI) – Bulgarian Academy of Sciences (BAS) will organize and host the international conference "*Mathematics Days in Sofia*", with preliminary details available at http://www.math.bas.bg/mds2014/.

pp. 1–9 , DOI: 10.2478/s13540-014-0151-y

Springer

In frames of this conference, we plan a "Transform Methods and Special Functions" (TMSF) minisymposium, *on occasion of 80th anniversary of Professor Ivan Dimovski* (http://versita.com/people/dimovski/), Corr. Member of BAS.

This will be the 7th in the series of the *international meetings TMSF* organized periodically in Bulgaria: 1994 (Sofia), 1996 (Varna), 1999 (Blagoevgrad), 2003 (Borovets), 2010 (Sofia), 2011 (Sofia); all details are at http://www.math.bas.bg/∼tmsf.

The *traditional topics* of the TMSF meetings are:

– Classical and Generalized Integral Transforms; – Fractional Calculus; Fractional Differential and Integral Equations; – Operational and Convolutional Calculus; – Special Functions, Classical Orthogonal Polynomials; – Geometric Function Theory, Functions of One Complex Variable; – Related Topics of Analysis, Differential Equations, Applications, etc.

Detailed information will be coming soon. Selected papers presented at this TMSF symposium will be considered for publication in "*Fractional Calculus and Applied Analysis*".

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Special session on
"Fractional Systems and Signals"
at the IFAC World Congress
August 24 – 29, 2014, Cape Town, South Africa
http://www.ifac2014.org/

Jocelyn Sabatier and Stéphane Victor (IMS – Laps, Bordeaux 1 University) are organizing a special session on "*Fractional systems and signals*" at the 19th IFAC World Congress, to be held in Cape Town, South Africa, 24-29 August 2014.

Submissions and interest to this special session can be addressed to:
Jocelyn Sabatier, e-mail: jocelyn.sabatier@u-bordeaux1.fr

2. Reports on Some 2013 Meetings Related to FCAA Topics

First Brazilian Symposium of
Fractional Calculus
September 23 – 27, 2013, UNESP - Campus de Bauru, Brazil
http://cmac.org.br/sudeste/2013

The Brazilian Society of Applied and Computational Mathematics (SBMAC), was created in November of 1978. Nowadays it is very popular

among the Brazilian researchers of the different areas of applied mathematics, due to the fact that SBMAC posses three magazines (*Notes in Applied Mathematics, Tema - Tendencies in Applied Mathematics* and *CAM - Computational & Applied Mathematics*) and organizes every year the *National Conference of Applied and Computational Mathematics - CNMAC*.

The CNMAC of 2013 took place at the *São Paulo State University - UNESP*, Bauru Campus, and was attended by 350 registered with 240 works, given by professors and students. The program can be seen at http://cmac.org.br/sites/cmac.org.br/files/folheto_programa_cmac-sudeste-2013_final_1.pdf.

Aiming to spread the fractional calculus in Brazil, as part of the activities of CNMAC 2013, we organized the *First Brazilian Symposium of Fractional Calculus*. It was in honor of Prof. Edmundo Capelas de Oliveira, a leading researcher in the area and probably the greatest popularizer of Fractional Calculus in Brazil and was funded by *FAPESP:* Foundation for Research Support of the State of Sao Paulo, process 2013/13753-7. Along with the presence of Brazilian researchers, the symposium included the distinguished presence of two of the biggest names in Fractional Calculus, Professors J.A. Tenreiro Machado, Porto - Portugal and Francesco Mainardi, Bologna - Italy.

Besides that, due to the large amount of works related to Fractional Calculus submitted for publication, beyond the usual 17 sub-areas, SBMAC created a new sub-area of applied mathematics "ST18 - Fractional Calculus and Applications", which featured works in oral technical sessions and panels, all with a quite expressive audience.

With all that has been said we can conclude that the event was a milestone for the development of fractional calculus in Brazil.

President of CNMAC 2013: *Rubens de Figueiredo Camargo*

International Conference on
Fractional Signals and Systems 2013
October 24 – 26, 2013, Ghent, Belgium

http://www.fss13.ugent.be

The main topics of the conference included: Signal analysis and filtering with fractional tools, Fractional modeling, Fractional system identification, Implementation aspects and Fractal structures. In total 32 people from 14 different countries attended the conference with a total of 28 papers.

The program included four topical issues (spread over 2 days) in the form of round table debates. The participants were urged to pose questions and debate about a general topic introduced by the main speaker. In

between the round table debates, six sessions with paper presentations were organized around the following subjects: Identification, Mathematics, Applications, Biology, Control I and Control II.

The first debate was introduced by Alain Oustaloup: "From diversity to unexpected dynamic performances". It discussed the state-of-art and directions of research for fractional signals and systems in engineering applications.

The next debate topic was introduced by J.A. Tenreiro Machado: "Have we found the Holy Grail?". It discussed the real-life systems that require fractional-order modelling and control through their intrinsic nature/properties. The "perfect" benchmark for testing fractional-order modelling and control methods is yet to be found/defined (i.e. Holy Grail connotations).

On the second day, the first debate topic was introduced by Richard Magin: "Fractional-Order Models of Anomalous Diffusion: Memory, Nonlocality and Entropy". It acknowledged the (ever-growing) recognition that fractional-order models often work better than integer-order models when describing the electrical and mechanical properties of multiscale, heterogeneous materials. In biology, such kind of systems are ubiquitous.

The fourth debate subject was introduced by Amélie Chevalier "A pragmatic design of fractional order PID controller". It discussed and compared different methods of fractional order PID design.

As a result of the conference, a special issue on Signal Processing (Elsevier) will be led by Prof. Manuel Ortigueira. Currently, efforts are being made by Dr. Clara Ionescu to initiate a second special issue on the topic of modelling and control of biological systems.

On behalf of Organizers, *Amélie Chevalier* (Ghent University)

International Conference
"Complex Analysis and Applications' 2013"
October 30 – November 2, 2013, Sofia, Bulgaria
http://www.math.bas.bg/complan/caa13

This conference was one of the events by which the Institute of Mathematics and Informatics - Bulgarian Academy of Sciences marked the *100th Anniversary of Academician Ljubomir Iliev* (1913-2000), a long-term Director of the Institute and one of the main figures in development of the Bulgarian contemporary mathematics.

The conference had *60 participants* from Austria, Belgium, Bulgaria, Hungary, Japan, Macedonia, Oman, Poland, Russia, Serbia, UAE, USA,

with talks in the following topics: – Functions of One Complex Variable; – Several Complex Variables and Complex Geometry; – *Special Functions and Integral Transforms*; – *Fractional and Operational Calculi*; – Real and Functional Analysis; – Geometry and Topology; – Methodology of Science and Education; - Varia in Analysis, Differential Equations, and their Applications. Invited *plenary talks* were given by: Bl. Sendov, P. Rusev, A. Sergeev, W. Tutschke, M.E.H. Ismail, S. Pilipovic, P. Popivanov.

The Program, Abstracts Brochure, Proceedings of CAA '13, and all other details are available to download from the conference website,

http://www.math.bas.bg/complan/caa13,

see additional information in the previous announce in *FCAA*, Vol. **16**, No 3 (2013).

Chair of the International Program Committee: *Virginia Kiryakova*

"Fractional Calculus, Probability and Non-local Operators: Applications and Recent Developments"

November 6 – 8, 2013, Bilbao – Basque Country – Spain

The workshop was devoted to celebrate Professor Francesco Mainardi from Department of Physics – University of Bologna, in the occasion of his retirement. The details, Program and Slides of talks can be download from the website

https://sites.google.com/site/fcpnlo/ ,

see also previous information in *FCAA*, Vol. **16**, No 3 (2013).

Prof. Mainardi is an active promoter of fractional calculus as a member of the editorial board of the journals *Fractional Calculus and Applied Analysis*, since its beginning, and of *Chaos, Solitons and Fractals*. At the end of 2000, he has created (with some collaborators) the specialized website **FRA**ctional **CAL**culus **MO**delling: http://www.fracalmo.org.

The workshop, organized by G. Pagnini (BCAM/Ikerbasque) and E. Scalas (East Piedmont University/BCAM, presently at the University of Sussex), was held at BCAM - Basque Center for Applied Mathematics (http://www.bcamath.org). The event was sponsored by the Basque Government, the East Piedmont University and the Berlin Mathematical Society and patronized by SIMAI, the Italian Society for Applied and Industrial Mathematics (http://www.simai.eu), and SEMA, the Spanish Society of Applied Mathematics (http://www.sema.org.es). A special issue is planned to be published in *Communications in Applied and Industrial Mathematics*, a journal by SIMAI (http://caim.simai.eu/index.php/caim).

The workshop was organized with 10 Invited Speakers: Italy (3); USA (3); Germany (3); UK (1). Special invited speakers were Professors

M. Caputo and R. Gorenflo that are well-known in the field and professionally very close to F. Mainardi. Unfortunately, health problems not allowed them to attend the workshop but their contributions were presented as well.

There were 35 accepted abstracts, of which the present speakers were 25: Austria (1); Algeria (1); BCAM/UPV (4); Germany (1); Italy (8); Spain (3); Poland (1); USA (1); UK (2); India (1); Portugal (1); Russian Federation (1), and 3 other participants without presentations, one student attender and one speaker received a grant to participate.

On behalf of the Organizing Committee: *Gianni Pagnini*

International Research and Development Conference
"Nigmatullin Readings 2013"
November 19 – 21, 2013, Kazan, Russia

Venue: *Kazan National Research Technical University (KNRTU) named after A.N. Tupolev*, formerly known as *Kazan Aeronautic Institute* (KAI), Kazan - Tatarstan R., Russian Federation.

Organizers: Ministry of Education and Science of the Russian Federation; Kazan Scientific Centre of the Russian Academy of Sciences; Tatarstan Council Of Ministers; Tatarstan Academy of Sciences; Russian Academy of Sciences named after K.E. Tsiolkovskiy; JSC "United Aircraft Corporation"; JSC "Kamaz", in cooperation with Northwestern Polytechnical University and Université de Poitier (France).

The conference was dedicated to the *90th birthday anniversary of Professor Rashid Sh. Nigmatullin* (1923 – 1991), a KAI rector (1967-1977), and Chairman of the Supreme Council of the Tatarstan Academy of Sciences, then TASSR (1971-1980), Head of the Theory of Radio-Engineering and Electronics Department (1954-1988). It took place in the frames of the International Congress "Science-Intensive Mechanical Engineering: Problems and Prospects for Development".

The conference aimed to discuss current issues on the *following topics*: *fractal* radio engineering and radio electronics; *integro-differentiation of fractional order and their applications*, radio and telecommunication systems, noise immunity, electronic warfare; molecular electronics, electrochemical systems, devices and sensors; antenna technology and microwave technology; fiber systems and processing of optical signals; *physical fractals*, modes, structures, materials; diagnostics of nanomaterials, nanoelectronics and photonics components; *fractal paradigm* in higher technical education; technical electrodynamics and photonics of living systems. The scientific

program was very busy, with 10 conference sessions on the above-mentioned topics.

During the congress, there was a memorial session with a biographical survey, exposition and movie picture presentation dedicated to the *125-th birth anniversary of A.N. Tupolev* (1888 – 1972), the famous USSR General (Aerocrafts) Designer, patron of the University.

Several talks were dedicated to the life of Prof. R.Sh. Nigmatullin and his contributions to both organizing of science and education and to his own scientific contributions, by Professors Yury K. Evdokimov ("Rashid Sh. Nigmatullin: Famous Scientist, Organizer of Science and Public Figure"), Raoul R. Nigmatullin, his elder son ("Physical Interpretation of Fractional Integral: from Integral of One-and-a-Half Order to an Integral with Complex Exponent"), and by others of his followers, among which are 4 Dr.Sci. and 25 PhDs, actively contributing to the science, its applications and industry in the areas of the conference topics. Invited foreigners also presented some survey talks related to the topics of R.Sh. Nigmatullin's heritage, as J.A. Tenreiro Machado (Portugal), V. Kiryakova (Bulgaria), R. El-Khazali (UAE), J. Legrand (France), S. Martemianov (France), etc.

Let us note that Prof. R.Sh. Nigmatullin *was the first* in Russia and among the pioneers of Fractional Calculus (FC) in the World, *who thought about practical applications of the operators of fractional differentiation.* It was in the 60's of last century, long before the first specialized conferences on FC had round tables discussions dedicated to the "open question": "*Is there any geometrical representation of a fractional derivative?* If not, can one prove that a graphical representation of a fractional derivative does *not* exist? ... The consensus of the experts ... is that there is, in general, *no* geometrical interpretation of a derivative of fractional order ... It can be asked, however at least for a geometrical meaning *or a physical phenomena* that can be represented by means of equations involving a derivative of a particular order such as 1/2 ...". (Ed. Note: and the conjecture then was for a negative answer.)

R.Sh. Nigmatullin suggested and realized for the first time an electrochemical device that performs the fractional integration / differentiation operation of the one-and-half order, one can find a reference in the Oldham-Spanier book to one of *his pioneering paper*:

R.Sh. Nigmatullin, V.A. Belavin, An electrical fractionally differentiation and integrating two-pole network. In: *Proc. Kazan Aviation Institute*, Issue 82 (1964), 58-65 (in Russian).

In the next issue of this journal (FCAA), we plan to reprint this paper translated in English, together with some more notes on his scientific contributions related to applications of FC operators.

3. New Recent Books

Vladimir V. Uchaikin, ***Fractional Derivatives for Physicists and Engineers***, Volumes **I** and **II**. Ser. Nonlinear Physical Science, Berlin - Heidelberg, Springer and Beijing, Higher Education Press, 2013, pISBN 978-3-642-33910-3, eISBN: 978-3-642-33911-0.

Volume **I**: Background and Theory; Volume **II**: Applications

Details at:

http://www.springer.com/physics/theoretical+mathematical +computational+physics/book/978-3-642-33910-3

Book Description: The first book combining a clear introduction to the fractional calculus with the description of a wide sphere of physical applications; Combined ease of access and breadth of scope; Enables readers to apply the new methods in their own research.

The first derivative of a particle coordinate means its velocity, the second means its acceleration, but what does a fractional order derivative mean? Where does it come from, how does it work, where does it lead to? The two-volume book written on high didactic level answers these questions. Fractional Derivatives for Physicists and Engineers- The first volume contains a clear introduction into such a modern branch of analysis as the fractional calculus. The second develops a wide panorama of applications of the fractional calculus to various physical problems. This book recovers new perspectives in front of the reader dealing with turbulence and semiconductors, plasma and thermodynamics, mechanics and quantum optics, nanophysics and astrophysics.

The book is addressed to students, engineers and physicists, specialists in theory of probability and statistics, in mathematical modeling and numerical simulations, to everybody who does not wish to stay apart from the new mathematical methods becoming more and more popular. Prof. Vladimir V. Uchaikin is a known Russian scientist and pedagogue, a Honored Worker of Russian High School, a member of the Russian Academy of Natural Sciences. He is the author of about three hundreds articles and more than a dozen books (mostly in Russian) in Cosmic ray physics, Mathematical physics, Levy stable statistics, Monte Carlo methods with applications to anomalous processes in complex systems of various levels: from quantum dots to the Milky Way galaxy.

Keywords: fractional derivatives - fractals physics - HEP - hereditarity - NPS - stable statistics - fractional differential equations - self-similar stochasticity.

Table of Contents: Physical Basics; - Fractional Derivatives; - Fractional Equations; - Applications; - Mechanics; - Kinetics; - Electrodynamics; - Atomic Physics; - Space Physics.

Ciprian A. Tudor, ***Analysis of Variations for Self-similar Processes*** (*A Stochastic Calculus Approach*). Ser. Probability and Its Applications, Springer, 2013, XI, 268 p., 1 illus.; ISBN: ISBN 978-3-319-00935-3.

Details at:
http://www.springer.com/mathematics/probability/
book/978-3-319-00935-3

Book Description: Introduces new concepts; Surveys modern techniques and new results on limit theorems and stochastic calculus; Useful to probabilists and statisticians.

Self-similar processes are stochastic processes that are invariant in distribution under suitable time scaling, and are a subject intensively studied in the last few decades. This book presents the basic properties of these processes and focuses on the study of their variation using stochastic analysis. While self-similar processes, and especially fractional Brownian motion, have been discussed in several books, some new classes have recently emerged in the scientific literature. Some of them are extensions of fractional Brownian motion (bifractional Brownian motion, subfractional Brownian motion, Hermite processes), while others are solutions to the partial differential equations driven by fractional noises.

In this monograph the author discusses the basic properties of these new classes of self-similar processes and their interrelationship. At the same time a new approach (based on stochastic calculus, especially Malliavin calculus) to studying the behavior of the variations of self-similar processes has been developed over the last decade. This work surveys these recent techniques and findings on limit theorems and Malliavin calculus.

Keywords: 60F05, 60H05, 60G18; Malliavin calculus - limit theorems - self-similar stochastic processes - stochastic equations - variations of stochastic processes.

Table of Contents: Part I: Examples of Self-similar Processes (Chapters 1–4); Part II: Variations of Self-similar Processes: Central and Non-Central Limit Theorems (Chapters 5–6); Appendix A: Self-similar Processes with Self-similarity; Appendix B: The Kolmogorov Continuity Theorem; Appendix C: Multiple Wiener Integrals and Malliavin Derivatives