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Workshop "Fractality and Fractionality"

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Abstract This short note is devoted to the "Fractality and Fractionality" workshop, held on 17–20 May 2016 in Lorentz Center (Leiden, Netherlands).

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Fractality and fractionality became a dynamic research topic during the last decades. The reason is that these notions, referring to selfsimilarity and irregularity, are encountered everywhere both in applied areas, such as geophysics, fluid mechanics, crystallography, astronomy, biology, chemistry, medicine, electronics, and in various mathematical areas: number theory, geometry, dynamical systems, probability theory, etc. The notion "fractality" is usually employed when the fractal behavior manifests itself statically as a spatial selfsimilarity property of the objects of systems involved in the research. The word "fractionality" is a dynamical counterpart of this notion, referring to the fractal evolution of individual agents in some macroscopic collections. Multifractality and multifractionality, which further extend these two notions, are used to describe objects, dynamical systems, and phenomena whose selfsimilarity properties are present only locally and varying with respect to time, space, or scale.

At the present time, there are different fields of mathematics related to fractality and fractionality: fractional calculus, fractal analysis, fractional dynamical systems, stochastic fractional analysis, multifractal analysis, etc. Motivated by numerous applications, a variety of problems occur, and the techniques are constantly developing.

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The dedicated conferences and journals help to keep up with the rapid development of the fields and to quickly disseminate the results and ideas.

The workshop "Fractality and Fractionality" was held in the Lorentz Center, Leiden, Netherlands, on 17–20 May 2016. The workshop drew considerable attention of the scientific community: it was attended by 56 scientists from 20 countries all over the world, almost reaching the maximal allowed number of 60 participants. The list of participants included such recognized specialists as Antoine Ayache (Université Lille 1, France), Serge Cohen (Université Paul Sabatier, Toulouse, France), Giulia Di Nunno (University of Oslo, Norway), Martin Grothaus (University of Kaiserslautern, Germany), Jun Kigami (Kyoto University, Japan), Virginia Kiryakova (Institute of Mathematics and Informatics, Sofia, Bulgaria), Anatoly Kochubei (Institute of Mathematics, Kyiv, Ukraine), Vassili Kolokoltsov (University of Warwick, United Kingdom), Yuriy Kondratiev (University of Bielefeld, Germany), Takashi Kumagai (Kyoto University, Japan), Nikolai Leonenko (Cardiff University, United Kingdom), Jacques Lévy Véhel (Anja Team, Inria, Nantes, France), Yuri Luchko (Beuth Technical University of Applied Sciences, Berlin, Germany), Francesco Mainardi (University of Bologna (Alma Mater), Italy), Enzo Orsingher (University of Rome "La Sapienza", Italy), Mark Podolskij (Aarhus University, Denmark), M. Dolores Ruiz-Medina (Granada University, Spain), Gennady Samorodnitsky (Cornell University, Ithaca, United States), Tommi Sottinen (University of Vaasa, Finland), Murad Taqqu (Boston University, United States).

The scientific committee of the workshop consisted of Yuliya Mishura, Georgiy Shevchenko (Taras Shevchenko National University of Kyiv, Ukraine), Peter Spreij (University of Amsterdam and Radboud University, Netherlands), Grygoriy Torbin (National Dragomanov University, Ukraine), and Martina Zähle (Friedrich Schiller Univerity of Jena, Germany). Thanks to the efforts of Lorentz Center staff, particularly the workshop coordinator Tara Seeger, the event went very smoothly and was greatly enjoyed by the participants.

Turning to the scientific part, the workshop had a broad scope: fractional calculus, fractional equations and fractional dynamics, fractional stochastic analysis, fractional and multifractional stochastic processes, applications of fractal and fractional analysis. Such a variety of topics resulted in effective dissemination of scientific ideas between specialists working in different research areas. The organizers made everything possible to promote scientific interaction and facilitate discussions. In view of this, the organizers have invited only top-class specialists to present their lectures in the traditional conference format, arranging a substantial part of the timetable as discussion sessions focused around specific topics: fractional stochastic calculus, fractals and stochasticity, models with fractional Brownian motion, fractional analysis with applications, statistical inference of fractional models. Besides scheduled scientific activities, a plenty of time was foreseen for informal discussions through long lunch breaks and several shorter breaks between the lectures. Without a doubt, the excellent facilities of the Lorentz Center played an important role in supporting all kinds of discussions and stimulating cooperation.

The workshop was concluded by a large round table session, where the participants have discussed the workshop outcomes, marked collaborative perspectives, and posed several open problems to work on in the future. It was decided that selected

papers of the conference participants will be published in the journals *Fractional Calculus and Applied Analysis* and *Modern Stochastics: Theory and Applications*. It is worth mentioning that the editors-in-chief of both journals were present at the workshop: Virginia Kiryakova (Fractional Calculus and Applied Analysis) and Yuliya Mishura and Kęstutis Kubilius (Modern Stochastics: Theory and Applications). During the round table, the participants unanimously praised high scientific level of the conference, extreme comfort of the Lorentz Center facilities, and friendliness and helpfulness of its staff. The participants expressed no doubt that the workshop will play an important role in further development of the fields related to fractality and fractionality.