

Report of the Evaluation Committee for the promotion of
Doc. RNDr. Artur Sergyeyev, Ph.D., DSc.,
to full professorship in the area Mathematics – Mathematical Analysis

The promotion procedure was started at the Mathematics Institute in Opava on February 23, 2022, in accordance with § 74 Art. 2 of the Czech Republic Law no. 111/1998 Coll. (the University Law). On March 3, 2022, and in the later per rollam vote on March 17 – 21, 2022, the Scientific Council of the Mathematics Institute approved the Evaluation Committee consisting of

Prof. RNDr. Miroslav Engliš, DrSc., Silesian University in Opava – chair
Prof. RNDr. Josef Mikeš, DrSc., Palacký University in Olomouc
Prof. Willard Miller, University of Minnesota, U.S.A.
Prof. RNDr. Eubomír Snoha, DSc., DrSc., Matej Bel University in Banská Bystrica, Slovakia
Prof. Sergei Trofimchuk, Universidad de Talca, Chile.

The Committee was subsequently appointed as approved. The Committee observed that the proposal fulfils all the requirements as stated in § 74 of the University Law, as well as all other conditions. The Committee assessed the qualifications of the applicant and issues the following report.

1. Personal data of the applicant

Name, surname: Artur Sergyeyev
Affiliation: Mathematics Institute, Silesian University in Opava
Born: [REDACTED] 1975
Address: [REDACTED]
Citizenship: [REDACTED]

Educational history:

1996	Specialist (equivalent of M.Sc.), summa cum laude, Department of Physics, National Taras Shevchenko University, Kyiv, Ukraine
2000	Cand. Phys.-Math. Sci. (equivalent of Ph.D.), Institute of Mathematics, National Academy of Sciences of Ukraine, Kyiv, Ukraine
2001	RNDr., Mathematics Institute of Silesian University in Opava, Czech Republic
2005	habilitation (Doc.), Mathematics Institute of Silesian University in Opava, Czech Republic
2020	DSc., Academy of Sciences of the Czech Republic, Prague, Czech Republic

Employment history:

1999 – 2000	Junior Research Associate, Division of Applied Research, Inst. of Mathematics, National Academy of Sciences of Ukraine, Kyiv, Ukraine (also 2001 – 2003 on leave of absence)
2000 – 2005	Assistant Professor, Mathematics Institute of Silesian University in Opava, Czech Republic
2005 –	Associate Professor, Mathematics Institute of Silesian University in Opava, Czech Republic

2. Pedagogical activity

Since 2000, the applicant has been teaching a number of regular courses at the Silesian University, both at the basic and the advanced levels and in bachelor as well as master programs. Since 2009 he has led a seminar on Differential Geometry and its Applications for graduate students and faculty of the Mathematics Institute. He is the chair of the committee for M.Sc. final exams in mathematics study programs. Since 2010 he has been the guarantor of the master study field Mathematics – Geometry and Global Analysis, and since 2018 the guarantor of the master study program Mathematics.

The applicant participates in educating the young scientific generation. He has supervised PhD theses since 2004, as well as diploma (master) thesis. Currently he is supervising two graduate students, Jakub Vašíček and Pavel Holba. In addition to his students and junior colleagues at the Silesian University (Petr Vojčák, Jiřina Vodová-Jahnová, Hynek Baran), the “scientific school” of his collaborators, followers and other people whom his work has significantly influenced includes also many authors from abroad (M. Blaszak, A. Karczewska, I.L. Freire, P. Rozmej, or J.P. Wang, to name at least a few).

Artur Sergyeyev also gave numerous lectures at various scientific institutions abroad (e.g. in the last 5 years: Sydney, Australia; Krakow, Poland; Vienna, Austria; Wroclaw, Poland). Long-term academic visits abroad: Jacob Blaustein Postdoctoral Fellow at Ben-Gurion University of the Negev, Israel (April 2003 – May 2004); Institut für Mathematik, Humboldt Universität Berlin (April – December 2001).

3. Scholarly and research activities

The main field of research of Artur Sergyeyev are structures related to systems of partial differential equations, like symmetries, conservation laws, recursion operators and Lax pairs, as well as related areas of mathematical analysis, differential geometry and mathematical physics.

Already one of A. Sergyeyev’s earliest papers has filled a substantial gap in the literature by showing that, under certain natural assumptions, for a partial differential system in two independent variables that can be brought into evolutionary form, the action of a recursion operator leaves invariant the space of the nonlocal symmetry shadows from the universal Abelian covering associated with the system. Another important contribution to the theory of recursion operators was the applicant’s 2017 paper providing a new construction of recursion operators of multivariable partial differential systems from their Lax pairs. This construction was subsequently applied by a number of other authors to find recursion operators for a variety of new dispersionless integrable PDEs. A new approach to show that a given evolution system has no genuine higher symmetries, and to give a complete description of its local conservation laws, was presented by the applicant jointly with R. Vitolo in a study of a PDE for shallow water waves; this approach can be applied to many other evolution systems in two independent variables. Perhaps one of the most impressive results of the applicant – it gave rise, among others, to an invitation for a talk of his in Vienna – is his new construction of 4-dimensional partial differential systems integrable in the sense of soliton theory; this construction makes use of contact geometry and shows, quite surprisingly, that such systems are significantly less exceptional than it was long believed. Furthermore, using this construction the applicant gave a first example of a 4D integrable system with a nonisospectral Lax pair that is not rational in the spectral parameter.

A common feature of Artur Sergyeyev's papers is his constant effort to get maximal possible result, combined with very careful treatment and exposition. Also, his scientific productivity has been continuously growing throughout his career.

The applicant gave talks about his research results on numerous international conferences, including 18 where some or all the expenses were covered by the organizers (12x in Poland, 2x France, 2x Czech Republic, Norway, Austria) and 8 where he was one of the invited/plenary speakers (5x Poland, Italy, Czech Republic, Thailand). He is a member of editorial board of 4 international journals published abroad, member of Advisory Panel of J. Phys. A, has served as a member of organizing or scientific committee of international conferences in several countries, as an opponent or committee member for habilitation procedures and PhD defenses or evaluator of grant and similar applications both in Czech Republic and abroad (the Netherlands, Italy, Austria), and as referee of many international journals.

4. Publications

Dr. Sergyeyev has authored or co-authored 51 papers in international journals, of which many are considered as prestigious by the mathematical community (e.g. Nonlinear Analysis: Real World Applications, Lett. Math. Phys., J. Math. Anal. Appl.), as well as 12 more papers in international conference proceedings. His papers earned more than 400 citations, of which more than 340 according to WoS (without self-citations or citations by co-authors) and 10 citations in monographs. These include more than 10 so-called qualified citations, where the citing author uses the cited result in an essential way.

5. Recommendations of independent experts

The applicant submitted recommendations in written form by the following experts:

Prof. dr. hab. Adam Doliwa, University of Warmia and Mazury, Poland

Prof. Dr. Michael Kunzinger, Universität Wien, Austria

Prof. Christodoulos Sophocleous, University of Cyprus, Nicosia, Cyprus.

A. Doliwa in his recommendation writes: "... Prof. Sergyeyev is an excellent researcher whose work combines high quality results in applications of differential equations with deep mathematics. He is very well regarded in the field, and I often see him giving invited talks at conferences on integrable dynamical systems. I strongly support the promotion of Professor Artur Sergyeyev to the Full Professor position in the Mathematical Institute at the Silesian University in Opava."

From the recommendation of *M. Kunzinger*: "... Dr. Sergyeyev is without doubt one of the main protagonists in the field of symmetry analysis and integrable systems today. Apart from his exceptionally deep contributions to research he also gives insightful and highly motivating talks. In addition, I want to emphasize his broad network of scientific cooperations and his ability to contribute to a wide variety of scientific topics in mathematical analysis as well as geometry, partial differential equations, and mathematical physics.

Summing up, I strongly support Artur Sergyeyev's promotion to full professor of mathematical analysis."

From the recommendation of *C. Sophocleous*: "... Dr. Artur Sergyeyev has a broad expertise in various techniques relevant in particular in symmetry analysis and integrable systems.

The portfolio of problems he has been working on is quite unique and impressive. The Recommender is well known and respected by researchers in his research area. His research achievements definitely stand out among those of many other scholars in his field who are at the same stage of their careers. Dr. Sergeyev's admirable track record to date shows that he is very active, and I have no doubts that he has very good perspectives to produce original and excellent research work in future as well.

In conclusion, I believe that Dr. Artur Sergeyev certainly has the scientific standing, maturity and expertise to be a successful leading researcher. His contribution to the area of symmetry analysis and integrable systems are very valuable to the progress of the field. I therefore enthusiastically support his promotion to Full Professor."

Conclusions

The Committee observes that the promotion of Doc. RNDr. Artur Sergeyev, Ph.D., DSc., to full professorship was started in accordance with § 74 of the Czech Republic Law no. 111/1998 Coll. (the University Law). The applicant submitted written supporting recommendations from three outstanding scholars. The Committee further observes that A. Sergeyev has gained international recognition for his scholarly work in the area of mathematical analysis. He has long been active as university teacher at the Silesian University in Opava. He takes part in educating the young scientific generation. The Committee observes that A. Sergeyev fulfils all the requirements as stated in §74 of the University Law as well as the conditions for promotion to full professorship in mathematical disciplines set by the Scientific Council of the Silesian University in Opava. Therefore,

**the Committee unanimously recommends to promote
doc. RNDr. Artur Sergeyev, Ph.D., DSc.,
to Full Professor in the area Mathematics - Mathematical analysis**

and presents this proposal to the Scientific Council of the Mathematics Institute in Opava for further proceedings.

Opava/Minneapolis/Talca, June 24, 2022

Prof. Miroslav Engliš

Prof. Josef Mikeš

Prof. Willard Miller

Prof. Lubomír Snoha

Prof. Sergei Trofimchuk


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