R E V I E W

On Competition for the occupation of the Academic Position "Associate Professor"
Professional Field 4.5 "Mathematics"
for the needs of Sofia University "St. Kliment Ohridski" (SU)
Faculty of Mathematics and Informatics (FMI)
announced in SG no. 56 of 30.06.2023 and on the FMI and SU websites

The review is prepared by: **Professor Vassil Mitev Vassilev, Ph.D.,**

Institute of Mechanics – Bulgarian Academy of Sciences,

Professional Field 4.5 "Mathematics",

Scientific Specialty "Mathematical Modelling and Application of Mathematics",

as a member of the Scientific Jury for the competition according to Order No. РД-38-514/ 29.08.2023 of the Rector of Sofia University.

The following candidates have submitted documents for participation in the competition:

• Asst. Professor Georgi Ivanov Georgiev, Ph.D., Department "Differential Equations" – FMI, SU

• Asst. Professor Svetlin Georgiev Georgiev, Ph.D., Department "Differential Equations" – FMI, SU

According to the Protocol of 31 August 2023 of the commission for admission of the candidates for participation in the competition, appointed by Order No. № РД 38-520/29.08.2023 of the Rector of Sofia University, the candidates admitted to participate in the competition are:

• Asst. Professor Georgi Ivanov Georgiev, Ph.D.

• Asst. Professor Svetlin Georgiev Georgiev, Ph.D., under the condition that he certifies with his signature his application for participation in the competition and provides the members of the jury with the missing scientific works, according to the requirements of Art. 107 (1), item 16, of the Regulations on the terms and conditions for acquiring scientific degrees and occupying academic positions at SU "St. Kliment Ohridski".

On 1 September 2023 Asst. Professor Svetlin Georgiev signed his application for participation in the competition and provided the members of the jury with the missing scientific works.

On 14 September 2023 Asst. Professor Georgi Georgiev has sent an application (Reg. index: 93-Г-196, Reg. date: 15.09.2023) to withdraw the documents submitted for participation in the competition, since he was elected as "Associate Professor" in Professional Field 4.5 "Mathematics" in scientific specialty "Differential Equations", which was approved by the Rector of SU.

Accordingly, **Asst. Professor Svetlin Georgiev Georgiev, Ph.D.**, remains the only candidate in the current competition.

I. General description of the presented materials

1.   **Information about the application**

Asst. Professor Svetlin Georgiev has presented all the documents required for the participation in the competition according to the requirements of the Act for the Development of the Academic Staff in the Republic of Bulgaria and of the Regulations for its implementation. To participate in the competition, the candidate submitted a list of a total of 2 titles: 1 publication in an international scientific journal of rank Q1 and 1 monograph. Another 8 monographs are presented, which are not included in the list of publications with which the candidate participates in the competition, but aim to demonstrate the fulfilment of the minimum national requirements for the occupation of the academic position "Associate Professor" in professional field 4.5 "Mathematics".

The submitted documents for the competition are very poorly designed and badly arranged.

There are many gaps and inconsistencies in them. As a whole, they do not give a good idea of either the teaching or research activity of the applicant for which much more and better-systematized information can be obtained from Scopus. For instance, the books he authored or co-authored are missing from the list of all his publications. They can be found in the presented list generated by the SU system "Authors", in his professional CV and in Scopus. From the presented list of citations, it can hardly be concluded that the citability of Dr. Svetlin Georgiev's works is particularly good. In the submitted author's summary of the candidate's original scientific contributions, such are not formulated. Vaguely, the candidate says to address "fundamental problems of ordinary and partial differential equations" (ODEs and PDEs) and proposes a new way that uses "new developments in the field of functional analysis" "to investigate the existence of positive periodic solutions for some classes of ODEs" and "for different type of problems for different classes of PDEs".

2. **Information about the applicant**

Svetlin Georgiev was born on 5 April 1974 in the city of Ruse. In 1997, he graduated in the speciality "Mathematics and Informatics", equivalent to obtaining a master's degree, at the Faculty of Mathematics and Informatics of the University of Veliko Tarnovo "St. St. Cyril and Methodius". In 2002, on the basis of a defended dissertation entitled "Periodic solutions of non-autonomous systems of the Lotka-Volterra type", he obtained the educational and scientific degree "doctor" in the specialty "Differential equations" in professional field 4.5 "Mathematics". In 2011, Dr. Svetlin Georgiev was elected "Assistant Professor" in the same speciality and professional field – an academic position that he currently holds at FMI - SU.

3. General characteristics of the scientific works and achievements of the candidate

The total number of publications of Asst. Professor Dr. Svetlin Georgiev, visible in Scopus (Author ID:7005135454), is 132, including 19 books, the chapters of two of which are included as separate documents. These publications have 254 independent citations, and the candidate *h*-index is 7 (excluding self-citations of all authors). This shows that the works of Dr. Svetlin Georgiev are well known to the respective scientific community and contribute to the development of the research in the field of his scientific work.

From the publications of Dr. Svetlin Georgiev, it can be seen that he has diverse scientific interests and in-depth knowledge in several areas of mathematics. Mainly, his scientific research is in the field of differential (ordinary, partial, stochastic, fuzzy, fractional) and integral equations, considered both in a traditional aspect (e.g. proving the existence of classical solutions) and in the framework of the so-called calculus on time scales, which in a certain sense unifies the differential equations and their difference analogues. In some of his works, Dr. Svetlin Georgiev presents and develops basic problems of the calculus of variations on time scales. He also examines problems related to mathematical models in physics, technical sciences, biology, etc. According to Scopus, one of his most cited works is on something different – the quaternionic calculus. This is his book *Real Quaternionic Calculus Handbook* (Birkhäuser, Basel, 2014), co-authored with J. P. Morais and W. Sprößig, which has 59 independent citations in Scopus. In a series of monographs, Dr. Svetlin Georgiev presents and develops the so-called iso-differential calculus and iso-mathematics in general, which in turn leads to new, non-traditional formulations of basic concepts and laws of physics.

Over the years, the candidate has participated in numerous important international conferences and other scientific forums at which he has presented reports (plenary and sectional) on the results of his scientific research.

As for his expert activity, Dr. Svetlin Georgiev is a member of the editorial board of the authoritative international journal *Mathematical Methods in the Applied Sciences* (John Wiley & Sons, IF: 2.90, rang Q1). He has made reviews for Mathematical Reviews (AMS) and Zentralblat MATH (EMS), as well as for the following scientific journals: *Signal Processing Letters* (IEEE, IF: 3.90, ранг Q2), *Applied Mathematics and Computations* (Elsevier, IF: 4.00 rang Q1), *Nonlinear Analysis, Theory, Methods and Applications* (Elsevier, IF: 1.4, rang Q1), *Electronic Journal of Differential Equations* (IF: 0.7, rang Q3), *Annual Review on Chaos Theory, Bifurcation and Dynamical Systems*.

The reference card presented by Asst. Professor Dr. Svetlin Georgiev concerning the fulfilment of the requirements for holding the academic position "Associate Professor" in the Professional Field 4.5 "Mathematics" at FMI – SU shows that he meets both the minimum national requirements of the Council of Ministers' Regulation for the implementation of the Act for the Development of the

Academic Staff in the Republic of Bulgaria (ADASRB) and the additional requirements specific to SU for occupying this academic position. I accept that the eight books that are presented in order to fulfil the requirements of indicators of group Г meet the definition of a monograph given in § 1, item 10 of Additional provisions of (ADASRB). The same holds true for the book presented as a habilitation work.

An inquiry at the National Center for Information and Documentation shows that the scientific works presented by the candidate for participation in the competition have not been used in previous procedures for the acquisition of a scientific degree or an academic position.

I am not aware of any plagiarism proved in accordance with the law in the scientific works submitted for the competition.

4. Characteristics and assessment of the candidate's teaching activity

I cannot give any assessment of the candidate's educational and teaching activities since he has not presented a job report on his teaching workload, nor has he provided information on this matter in his professional CV.

5. Analysis of the applicant's scientific and applied scientific achievements contained in the materials presented for participation in the competition

There are two publications with which Dr. Svetlin Georgiev participated in the current competition:

1. T. Xiang and S. Georgiev. Noncompact-type Krasnoselskii fixed point theorems and their applications. *Mathematical Methods in the Applied Sciences*, **39**(4), 2016, 833–863.

2. S. Georgiev. *Variational Calculus on Time Scales*, Lambert Academic Publisher, Beau Bassin, Mauritius, 2019, *viii*+226 pages, ISBN: 978-613-9-93294-8.

The work [1] was published in a prestigious journal with an impact factor of 2.90 and a rank of Q1 (published by John Wiley & Sons). It examines problems related to the existence and uniqueness of solutions of a class of transport differential and integral equations, which are used in the mathematical modelling of processes and phenomena in various areas of mathematical physics. For that purpose, the tasks are reduced to fixed-point problems for a sum of two operators that are not required to be continuous or compact. Using theorems proven in the work extending the fixed point theorems of the Krasnoselskii and Sadovskii type known in the literature, the article investigates and proves the existence and/or uniqueness of solutions of some classes of the considered problems. The paper is co-authored with T. Xiang, but I assume that the contributions of the two co-authors are equal, as there is no declaration for partition of contributions. The problems are well formulated. An analysis of the existing methods for solving them has been made, and their modifications and

generalizations have been developed and used. The list of used literature contains 41 references, which testifies to a very good literary awareness of the authors. I would characterise the contributions as purely scientific and enriching the existing knowledge. This is the candidate's most cited journal publication. It has 11 independent citations, according to Scopus.

In the monograph [2], Svetlin Georgiev presents the foundations of the calculus of variations on time scales. The book contains 8 chapters, in which analogues of basic concepts and theorems from the classical calculus of variations and the theory of dynamical and Hamiltonian systems are defined and proved in the context of this formalism, consistently and almost without comments. The book gives definitions for derivatives and integrals of functions defined on time scales (including n-dimensional) and derives their properties. The corresponding notion of a functional is introduced and second-order self-adjoint matrix equations are investigated. Linear Hamiltonian dynamical systems are studied. An analogue of the du Bois-Reymond lemma is proved on time scales, the first and second variations of a functional are defined, and in the one-dimensional case, the Euler-Lagrange equation, the Legendre condition and the Jacobi condition are derived. Higher-order calculus of variations on arbitrary n-dimensional time scales is also considered and the corresponding Euler-Lagrange equations are derived. In the last chapter of the monograph, the notion of invariance of a functional with respect to transformations is defined and an analogue of Noether's second theorem is proved. In my opinion, the author has a very good literary awareness of the topics covered in the monograph, although the bibliography contains only 7 references.

I cannot precisely estimate whether there are new results (new knowledge) in this monograph authored by Dr. Svetlin Georgiev, but I accept that it contains scientific contributions. I will note that this work has only one independent citation visible in Scopus and that is to the book S. Georgiev. *Variational Calculus on Time Scales*, Nova Science Publishers, Inc., New York, 2018. x+297 pp. ISBN 978-1-53614-376-8, of which [2] is probably a reprint in Lambert Academic Publisher. This same edition is also referenced in the databases Mathematical Reviews (AMS) and Zentralblat MATH (EMS).

6. Critical notes and recommendations

I have no critical remarks on the two scientific works, presented for participation in the competition, that would affect my general conclusion.

7. Personal impressions of the candidate

I do not know the candidate personally and have no personal impressions of him and his activities.

8. Conclusion on the application

Having acquainted with the materials and scientific works presented in the competition and based on the analysis of their significance and the scientific contributions contained in them, **I confirm** that the scientific achievements meet the requirements of the Act for the Development of the Academic Staff in the Republic of Bulgaria, the Council of Ministers' Regulation for its implementation, and the respective Regulation on the terms and conditions for acquiring scientific degrees and occupying academic positions at SU "St. Kliment Ohridski" for acquiring the academic position "Associate Professor" in the professional field 4.5 "Mathematics", scientific speciality "Ordinary differential equations, Hamiltonian systems and applications". In my opinion, the candidate satisfies the minimum national requirements in this professional field. I do not detect the presence of plagiarism in the scientific works submitted for the competition. I give my **positive assessment** of the application.

II. GENERAL CONCLUSION

Based on the above, I recommend the scientific jury to propose to the competent authority for the selection of the Faculty of Mathematics and Informatics at SU "St. Kliment Ohridski" to elect Asst. Professor Dr. Svetlin Georgiev Georgiev to take the academic position "Associate Professor" in professional field 4.5 "Mathematics", scientific specialty "Ordinary differential equations, Hamiltonian systems and applications".

27.10.2023 г.   Reviewer: ....
                                                        (Prof. Vassil M. Vassilev, Ph.D.)