Report

on the competition for the occupation of the academic position „Associate Professor“
in the professional field 4.6 Informatics and Computer Science,
specialty Informatics (Modeling of complex systems with large dimension)
for the needs of the Institute of Mathematics and Informatics,
Bulgarian Academy of Sciences,
announced in the State Gazette, № 8/29.01.2021

by Prof. Dr. Kalinka Kaloyanova
Institute of Mathematics and Informatics - BAS

I am presenting this review as a member of the Scientific jury in the above-mentioned competition, on the base of the order № 47/26.03.2021 of the Director of the Institute of Mathematics and Informatics (IMI) - BAS, which is based on the decision of the Scientific Council of IMI (Protokol №5, 19.03.2021).
The only candidate for the competition is Assistant Prof. Venelin Lubomirov Todorov from the Institute of Mathematics and Informatics - BAS.

As a member of the jury I have received the following documents:

1. Application to the Director of the Institute of Mathematics and Informatics;
2. CV;
3. Copy of master’s degree diploma;
4. Copy of diploma for the educational and scientific degree “Doctor”;
5. List of all scientific publications;
6. List of the scientific publications for the participation in the competition;
7. Author's reference for the scientific contributions of publications presented for the participation in the competition (in Bulgarian and English);
8. Abstracts of the scientific publications for participation in the competition (in Bulgarian and English);
9. Copies of publications for participation in the competition;
10. List of all citations;
11. List of citations for participation in the competition;
12. Copy of State gazette № 8, 2021
13. Certificate of internship in the specialty;
14. Additional documents - certificates for awards of the candidate;
15. Reference for the fulfillment of the minimum requirements -Application 2.2;

16. A declaration that the presented publications and citations are not used in other procedures.

A short CV

Venelin Todorov graduated from the “Baba Tonka” Secondary School of Mathematics in Ruse in 2005. He graduated from the Faculty of Mathematics and Informatics (FMI) at Sofia University "St. Cl. Ohridski ”with a bachelor's degree in Mathematics in 2009 and a master's degree in Applied mathematics in 2011. He defended his dissertation on "Monte Carlo methods for multidimensional integrals and integral equations and applications" in 2017 at IICT-BAS. In the period 2015-2016, he worked as an assistant at UNWE, from 2017 to 2019 - as an assistant at IMI-BAS, from 2019 he is a chief assistant at IMI-BAS. Since March 2014 he has been working as a mathematician at IICT-BAS.

General presentation of the materials, submitted for the competition. Compliance with the minimum requirements

It is clear from the presented documents that Venelin Todorov meets the requirements for the occupation of the academic position of "Associate Professor", which are specified in the Act for the Development of the Academic Staff in the Republic of Bulgaria and the Rules of the Implementation of the Act for the Development of the Academic Staff in the Republic of Bulgaria:

- He has a Ph.D. degree: Ph.D. thesis on "Monte Carlo Methods for Multidimensional Integrals and Integral Equations and Applications " (2017) - diploma № 000934/ 23.10.2017, from the Institute of Information and Communication Technologies -Bulgarian Academy of Sciences.
- He has presented 5 publications with SJR, indexed in Scopus, and one publication indexed in Scopus and IEEE Xplore - a total of 112 points, which cover the requirements of the indicators of group “B”. The publications were made in the period 2017-2021.
- To meet the requirements of the indicators from group “Г”, 12 publications with impact rank (SJR) were presented - 240 points. The publications were made in the period 2017-2020.
- All these publications are not used for other procedures.
- The total number of publications with IF or SJR submitted for the competition is 17, which meets the specific requirements of Art. 3 (1) of the Rules on the Terms and Requirements for Acquisition of Academic Degrees and Occupation of Academic Positions of IMI-BAS.
- A list of 14 citations is presented – 84 points, which meet the requirements of group „Д“ indicators.

- Venelin Todorov has held academic positions assistant for more than 3 years according to the presented documents.
- He also participated in 2 research projects, funded by the Bulgarian National Scientific Fund and one project funded by the Ministry of Education and Science – 30 points for group „E“.
- There is no identification of plagiarism in the presented publications of V. Todorov.

Based on the above, the criteria of IMI-BAS have been achieved and exceeded in some of the indicators, therefore the minimum national requirements according to the Rules for the Implementation of the Act on the Development of the Academic Staff in the Republic of Bulgaria for the professional field 4.6 "Informatics and Computer Sciences" have been achieved, too.

General characteristics of the applicant's scientific and applied activities and his contributions in the submitted publications

Venelin Todorov has submitted 20 publications for this competition. Most of the results presented here have been published in Impact Rank (SJR) series - seventeen publications, one publication is indexed by Scopus and IEEE Xplore, and two publications are not indexed. All publications are co-authored. Taking into account the described results, the consistency in the research, the fact that he is the first author of many of them, and the common list of 78 publications of Venelin Todorov I accept that his contribution is significant.

The research activities of the candidate reflected in his publications for the competition are mainly related to the development of new efficient approaches for working with large-scale systems and fully correspond to the field of the competition.

The results presented in the publications replacing the habilitation thesis (group “B”) are related to the development and application of statistical methods to complex systems in ecology. These articles present new stochastic approaches to the sensitivity analysis of a complex large-scale model describing air pollutants in an area that includes Europe, the Mediterranean, and some parts of Asia and Africa.

Several new and modified stochastic methods for sensitivity analysis of a complex ecological system with large dimension are described in publications B1, B2, B3, and B4, and new applications of statistical methods in the analysis of large-scale ecological models - in publications B7 and B8. Two other publications (B5 and B6) present a new Monte Carlo algorithm for solving large systems of linear equations and an improvement of the „walk on equations“ Monte Carlo method.

Several publications in Group “Г” also present results related to the analysis and modeling of complex large-scale systems.

Several publications present results from the applications of different methods for sensitivity analysis and comparisons between them. Г1 presents the application of a modification for obtaining the Latin hypercube sampling and its comparison with the adaptive approach, in Г2 - for sensitivity analysis the Faure sequence has been applied. In Г3, a comparison is made between the use of an approximate calculation of the total sensitivity indices through a quasi-random sequence of scrambled Sobol and Halton sequence. These two methods are compared with the method for approximate calculation of the total sensitivity indices by a lattice-type point set with generating vector based on the generalized Fibonacci numbers in Г4, and in Г5 the last one method is compared with the methods described in Г1 and Г3.

Г6 presents the development of a new lattice-type point set with generating vector by the method of reflection for numerical calculation of multidimensional integrals related to the evaluation of European options, and in Г7 - an improved quasi-Monte Carlo method based on the scrambling of the Sobol sequence by the Matousek for evaluation of multidimensional integrals with high dimensions in statistics, which achieves high accuracy (also for integrals with high dimensions).

Several other publications in this group - Г8, Г9, and Г10 present significant results through the application of new schemes in high-order numerical methods for modeling large-scale ecology problems such as air pollution.

The last two publications on the list - Г11 and Г12, present methods for solving differential equations.

Citations

The citation report for the competition, submitted by the candidate, lists 14 citations, all visible in Scopus.

Personal impressions

I haven’t personal impressions of Venelin Todorov.

Comments and recommendations

I recommend Venelin Todorov to aspire to single-authored publications in the future.

Conclusion

In conclusion, the documents and materials presented by Assistant Prof. Venelin Todorov declare results that meet all requirements for the academic position of "Associate Professor" of the Act of the Development of the Academic Staff of the Republic of Bulgaria, the Rules for its implementation, as well as of the Rules on the Terms and Requirements for Acquisition of Academic Degrees and Occupation of Academic Positions of IMI-BAS in the scientific field 4. Natural Sciences, Mathematics

and Informatics, professional field 4.6. Informatics and Computer Sciences, and even exceed some of them.

I recommend to the Honorable Scientific Jury to vote on a proposal to the Scientific Council of IMI - BAS to select Venelin Lubomirov Todorov for the academic position of "Associate Professor" at IMI - BAS in the field 4.6. Informatics and Computer Sciences, specialty Informatics (Modeling of complex systems with large dimension).

May 7, 2021 Signature:

/Prof. Dr. Kalinka Kaloyanova/