Opinion

By Assoc. Prof. Dr. Stoyan Atanasov Poryazov,
Institute of Mathematics and Informatics, Bulgarian Academy of Sciences (MI-BAS),

Member of the Scientific Jury, on the basis of Order 186/07.04.2023 of the Director of IMI-BAS, regarding the candidates for the competition for the academic position „Associate Professor", in the field of higher education 4. Natural Sciences, Mathematics and Informatics, Professional Direction 4.6. "Informatics and Computer Sciences" (Computer modelling of complex systems of large dimensions), for the needs of IMI-BAS (Informational Modelling Department), announced in the "State Gazette", No. 14 /10/02/2023.

1. Education and experience

Only one candidate participated in the contest - Dr. Ivan Radoslavov Georgiev, who fulfils the regulatory requirements of the competition for education and internship: He holds a Bachelor's degree (2005) in Mathematics and Informatics Education Pedagogy and a Master's degree (2009) in Informational and Educational Technologies at the Ruse University Angel Kanchev. There he also defended his dissertation (2015) on doctoral program 4.5. Mathematical modelling and applications of Mathematics. At the University of Ruse, he was successively: a Part-time Assistant (2005 - 2009), Assistant (2009 - 2016), Chief Assistant (2016 - 2022) and Associate Professor (from 2022) in the Department of Applied Mathematics and Statistics, in professional direction 4.5 Mathematics.

2. Description of the presented scientific materials

The candidate submitted 46 articles, co-author of one monograph, published in Bulgaria, in three thematic volumes published by Springer and one electronic textbook published by Ruse University.

All submitted publications are on the subject of the competition and have not been used for other academic growth procedures. According to scientometric indicators, they significantly exceed the minimum requirements of IMI-BAS for an associate professor in specialty 4.6.

Scientific results have been presented and discussed in 39 presentations at renowned international conferences.

3. General characteristics of the presented scientific research and scientific-applied methods and results of the candidate

For the purposes of Informatical Modelling of complex high-dimensional systems, various mathematical and informatics tools are inevitably developed and applied. In the presented articles, the candidate has developed and used: Finite Element Methods, Financial Mathematics, Markov chains, Queuing Service Theory, Multicriteria Optimization, ARIMA (Autoregressive Integrated Moving Average), its modification X-13ARIMA-SEATS, the Monte Carlo method , heuristic, genetic, stochastic, etc. algorithms, Mixed-integer Linear Programming (MILP). Based on numerical algorithms for solving systems of differential equations, time series forecasting approaches have been developed and a working Informatical model that allows easy application of the model in various fields.

For all developed methods and tools, Informatical models have been developed, programmed and tested, using the software products: the language R, Matlab R2017b and IBM SPSS. Some of the Informatical models are of significant complexity because they solve NP-complete problems.

All program implementations are used to solve important practical tasks, some of which are:

• Optimal risk portfolio, stock price forecasting

• Optimization of the development of multimodal and intermodal transport

• Optimization of work processes

• An approach for evaluating the optimal location of apiaries in flat and hilly areas

• Analysis of statistical results and justification of the criteria for complex assessment in the analysis of electrocardiographic signals

• Modelling and researching the effect of the strength, timing and duration of restrictive measures on the spread of an infectious disease.

• Study of the dynamics of air pollution.

• Dynamics of temperature changes in residential premises.

4. Significance of contributions for science and practice

The obtained results are scientific and scientific-applied, because they contain the development of mathematical and informatical methods and are useful for modelling and optimization of complex systems of a large dimension, which have important economic and social importance.

All submitted articles are indexed in Scopus, 10 have IF or SJR. 41 citations are attached.

The results have been used in 13 research projects in which the applicant is a participant.

5. Critical notes and recommendations

1. In the description of the projects in which the candidate participated, their deadlines and their financing organizations are not indicated, which information is necessary.

2. In the report on the contributions, the candidate did not sufficiently describe the informational side of his results, which is understood from the text of the articles, but only from readers familiar with the problems of computer implementation of the developed methods and the complexity of the tasks to be solved.

Conclusion

The materials presented by the candidate and my personal impressions of him show that he has in-depth theoretical and practical knowledge and experience in modelling and computer optimization of complex high-dimensional systems.
I accept that the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the regulations for its implementation and the relevant regulations of IMI-BAS have been met.
I give my positive assessment and recommend to the Honourable Scientific Jury to award the academic position „Associate Professor", in the field of higher education 4. Natural Sciences, Mathematics and Informatics, Professional Direction 4.6. "Informatics and Computer Sciences" (Computer modelling of complex systems of large dimensions), to the Dr. Ivan Radoslavov Georgiev, for the needs of IMI-BAS (Informational Modelling Department).

Date: 25/05/2023

Member of the Scientific Jury:

/Assoc. Prof. Dr. Stoyan Poryazov/