STATEMENT

By Prof. D.Sci. Ognyan Kounchev, IMI-BAS

On the competition for an academic position of Assoc. Professor
In professional direction 4.6 Informatics and computer sciences,
For the needs of Institute of Mathematics and Informatics, BAS,
Faculty of mathematics and informatics (FMI),
Announced in the State newspaper, number 8 от 29.1.2021,
and online on the website of IMI-BAS

The present Statement has been prepared by Prof. DSci Ognyan Kounchev, IMI-BAS, as a member of a scientific jury, in the professional direction 4.5 Mathematics, scientific area Probability and Statistics (Stochastic models in finance), by a competition according to an Order number 47/26.03.2021 by the Director of IMI-BAS.

For participation in the competition, the only candidate who has submitted documents is Assist. Venelin Lyubomirov Todorov, PhD, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences.

I. General description of the materials presented

1. Data about the application

The documents submitted by the candidate by the candidate comply with the requirements of ZRASRB, PPZRASRB, the Regulations on the terms and conditions for acquiring scientific degrees and for holding academic positions in the Bulgarian Academy of Sciences (PURPNSZAD-BAS) and the Regulations on the terms and conditions for acquiring scientific degrees and for holding academic positions at the Institute of Mathematics and Informatics at BAS (PURPNSZAD-IMI-BAS).

To participate in the competition, the candidate Dr. Venelin Lyubomirov Todorov presented a list of a total of twenty (20) titles, representing publications in Bulgarian and foreign scientific journals and scientific forums. Several diplomas for scientific awards were presented, including the Grand Prize of BAS for young scientists "Professor Marin Drinov" for 2019, supporting the achievements of the candidate.

The documents are regular and correctly reflect both the scientific activity of the candidate and his employment in national and international research projects.

2. Data about the applicant

PhD Venelin Lyubomirov Todorov graduated with a master's degree in applied mathematics from FMI-SU in 2011 with excellent results. In the period 2011-2017 he was a doctoral student at the

Institute of Information and Communication Technologies at the Bulgarian Academy of Sciences (IICT-BAS), where under the supervision of Prof. Ivan Dimov he defended his dissertation on "Monte Carlo methods for multidimensional integrals and integrals of equations and applications ". Venelin Todorov has been working at IMI - BAS, since December 2017 as an assistant and since 2019 he has been a chief assistant.

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

Venelin Todorov works actively in the field of Monte Carlo probability methods for multidimensional integrals, integral equations and linear systems, and he also has results in numerical methods for differential equations. He has published 78 articles in his scientific career, 5 of which have an impact factor and 33 have an impact rank, and 28 articles are reflected in Scopus. Generally speaking, Venelin Todorov's contributions can be grouped in the following areas - new Monte Carlo methods for sensitivity analysis of complex systems with large dimensions in ecology, evaluation of multidimensional integrals with high accuracy in financial mathematics, physics and statistics , new Monte Carlo methods for integral equations and linear systems with applications, numerical methods for differential equations.

Venelin Todorov has submitted a total of 20 publications for the competition, of which 17 publications with impact rank (SJR), 6 in the series American Institute of Physics, 5 in the Springer series in category Q4 of Scopus Studies in Computational Intelligence and 6 in the Springer series in the category Q2 of Scopus Lecture Notes in Computer Sciences). An article is also presented, which is referenced (in Scopus). Publications can be grouped in the following areas (numbering is according to the list provided):

1. Development of new effective stochastic approaches for sensitivity analysis of a complex system of large dimension, describing a model of long-range transport of pollutants in the air - [B1, B2, B3, B4, B7, B8, G1, G2, G3, G4, D5];

2. Development of a new method "Monte Carlo" for linear systems of large dimension, with application in ecology - [B5, B6];

3. Development of new Monte Carlo methods for evaluation of European options with large dimension - [G6];

4. Development of new methods "Monte Carlo" for estimation of multidimensional integrals with high dimensionality in statistics - [G7];

5. Construction of new numerical methods with high order of accuracy on the basis of differential schemes for model problems in ecology with large dimension - [G8, G9, G10];

6. Other contributions - [G11, G12].

In accordance with the criteria, I positively evaluate the scientific work of Venelin Todorov: The presented articles exceed the minimum national scientometric requirements (under Art. 2b, para. 2 and 3 of ZRASRB) and respectively the additional requirements of IMI-BAS for occupying the academic position "Associate Professor" in the scientific field and professional direction of the competition.

Scientific publications do not repeat those of previous procedures for obtaining a scientific title and academic position, and are not used for registration with NACID. I have no doubts about plagiarism in the scientific papers presented at the competition.

Venelin Todorov presented 14 citations, which are reflected in the Scopus databases, as 4 of the citing articles have an impact factor and are in category Q1, which brings 84 points with a required minimum number of 70 points. The applicant also fulfills all other formal requirements in the above-mentioned documents.

4. Characteristics and evaluation of the teaching activity of the candidate

According to the presented data, in 2015-2016 Venelin Todorov led exercises in higher mathematics for students majoring in "Business and Economics" at UNWE.

5. Content analysis of the scientific and scientific-applied achievements of the candidate, contained in the materials for participation in the competition

The main contribution of the candidate in the above areas 1.-4. is to obtain new, original results in the field of stochastic Monte Carlo models for complex large-scale systems.

a) Particular attention should be paid to the candidate's articles in the field of Monte Carlo methods for sensitivity analysis of a model of a complex system of large dimension, describing a model of long-range transport of pollutants in the air, where many of the presented methods are applied for the first time, and significantly higher accuracy is achieved than the existing methods.

b) On the other hand, the candidate has several articles in the series (in category Q2) of Scopus Lecture Notes in Computer Sciences and in the series (in category Q4) of Scopus Studies in Computational Intelligence, in which he develops his original approach to modeling complex systems with large dimension, describing the transport of pollutants into the air. Some of these works are joint, but the

candidate has a leading role. According to the tradition in the field, this is supported by the fact that he is the first co-author in most of the presented publications. It should be noted that nowadays the modeling of air pollution is a very popular field of research. The candidate demonstrates mastery of the technique of probabilistic methods "Monte Carlo" and quasi- "Monte Carlo", as well as professionalism in their application to Modeling of complex systems with large dimensions in ecology and other areas.

c) The candidate has also made an original contribution to the development of a new Monte Carlo method for linear systems, as numerical experiments confirm the method as one of the best known modern stochastic methods for linear systems [B5, B6].

d) Last but not least, we should mention the work [D6] in the field of financial mathematics, which shows the skills of the candidate to develop new methods for evaluating European options with a very large dimension. In [D7], the candidate applies for the first time effective stochastic approaches for multidimensional integrals with high dimensionality, which are important for algorithms applied in the field of Artificial Intelligence.

e) The candidate also develops numerical methods with high order of accuracy based on differential schemes for model problems with large dimension in ecology [G8, G9, G10], as well as new numerical methods based on fractional polynomials and generating functions [G11, G12].

6. Critical remarks and recommendations

I have no significant critical remarks.

As a recommendation: The results in the field of Monte Carlo methods / models have the prospect of application to other important areas of finance, for example in fixed income products, in the LMM and SMM models, where the lack of explicit formulas requires the application of methods of type "Monte Carlo".

7. Personal impressions about the candidate

I do not have personal impressions of Venelin Todorov.

8. Conclusion on the application

After getting acquainted with the materials and scientific works presented in the competition and based on the analysis of their significance and the scientific and scientific-applied contributions contained in them, I confirm that the scientific achievements meet the requirements of ZRASRB, the Regulations for its application. , and the respective Regulations of BAS and IMI-BAS for holding by the candidate the academic position "Associate Professor" in the scientific field and professional field

of the competition. In particular, the candidate satisfies the minimum national requirements in the professional field and no plagiarism has been established in the scientific papers submitted at the competition. I give my **positive assessment** of the candidacy.

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II. GENERAL CONCLUSION

Based on the above, I recommend the scientific jury to propose to the competent body for the selection of the Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences to choose Dr. Venelin Todorov to take the academic position of "assistant professor" in a professional field 4.6 Informatics and computer sciences, scientific field Informatics (Modeling of complex systems with large dimension).

Sofia, 7.5.2021. г. **Signature:**

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