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STATEMENT

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on the materials submitted for participation in the contest for occupation of the academic position "Associate Professor" in the Faculty of Mathematics and Informatics of Sofia University "St. Kliment Ohridski" in Area of Higher Education 4. Natural Sciences, Mathematics and Informatics, Professional Field 4.5 Mathematics (Mathematical modeling and application of mathematics in mechanics and robotics), announced in State Gazette No 21/15.03.2022.

In the Contest for the academic position "Associate Professor" announced in State Gazette No 21/15.03.2022 and on the web site of Sofia University "St. Kliment Ohridski" (in short, henceforth abbreviated as SU) for the needs of Faculty of Mathematics and Informatics (FMI) participates only one candidate: Assistant Professor Alexander Alexiev Stefanov, Ph.D. – Faculty of Mathematics and Informatics, Sofia University "St. Kliment Ohridski".

Review Author: Professor, Kamen Krastev Delchev, Ph.D. – Faculty of Mathematics and Informatics, Sofia University "St. Kliment Ohridski".

By Order No RD-38-234 / 11.05.2022 of the Rector of SU I was appointed as a member of the Scientific Jury of the aforementioned Contest. By a decision of this Scientific Jury from 20.05.2022 I was assigned to write a review of the Contest.

I.   General description of the procedure and submitted documents
1.   General description of the submitted materials

The deposed by the candidate set of documents comply with the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADASRB), the Rules for Implementation of the ADAS in the Republic of Bulgaria (RI-ADAS in the RB) and the Rules on the Terms and Requirements for Acquisition of Scientific Degrees and Occupation of Academic Positions at Sofia University.

Assistant Professor Alexander Alexiev Stefanov, Ph.D., presented a list of a total of 16 titles for participation in the competition, incl. 16 publications in Bulgarian and foreign scientific publications and scientific forums. There are also 17 other documents (in the form of official notes and certificates from the employer, project manager, funding organization or project assignor, references and feedback, awards and other relevant evidence) supporting the candidate's achievements.

2.   Brief biographical data about the candidate.

Assistant Professor Alexander Alexiev Stefanov, Ph.D., graduated successively:
"Engineering Physics" - Bachelor (October 2006 - July 2010), "Theoretical and Mathematical Physics" - Master (October 2010 - October 2011) and PhD in "Theoretical and Mathematical Physics" (January 2012 - March 2016) at the Faculty of Physics in Sofia University "St. Kliment Ohridski".

From 15.04.2015 until now, the candidate holds the position of "Part-time Assistant Professor" at the Institute of Mathematics and Informatics of the Bulgarian Academy of Sciences, and from 15.06.2015 to 07.07.2017 - "Assistant Professor" at the Faculty of Mathematics and Informatics, Sofia University "St. Kliment Ohridski". From 07.07.2017 until now Dr. Alexander Alexiev Stefanov holds the position of "Chief Assistant Professor" at the FMI of Sofia University.

3. **General characteristics of the scientific works and achievements of the candidate**
The scientific papers submitted for participation in the competition can be referred to the following scientific fields: Nonlinear Equations of Mathematical Physics (7 articles); Robotics (2 articles); Electronics and Measurement in Physics (4 articles); Optics (2 articles); Quantum Mechanics (Quantum Informatics - 1 article).
The scientific works meet the minimum national requirements (under Art. 2b, para. 2 and 3 of ADASRB) and respectively the additional requirements of Sofia University "St. Kliment Ohridski" to hold the academic position of "Associate Professor" in the scientific area and professional field of the competition. They fully cover and exceed the minimum national requirements (for "associate professor"), as for group B.4 the presented articles give 186 points (on demand - 100 points), and for group D.7 - 486 points (on demand - 200 points).
The scientific papers submitted by the candidate have not been used to obtain other scientific degrees and academic positions and there is no plagiarism proven in accordance with the law.

4. **Characteristics and evaluation of the candidate's teaching activity**
The assessment of the educational and pedagogical activity of the candidate is definitely positive. According to the submitted report, the candidate has significant teaching activity:
   - Lectures - a total of 9 semesters (5 - Informatics for the Faculty of Biology at Sofia University; 4 - Applied Mathematics 3 and 1- Mathematical analysis of a function of many variables for Faculty of Physics at Sofia University),
   - Exercises - a total of 20 semesters (3 - Analytical Mechanics and 3 - Dynamics for FMI at Sofia University; 3 - Mathematics and 4 - Mathematics and Informatics; 4 - Mathematical analysis of a function of many variables and 3 - Applied Mathematics 2 for Faculty of Physics at Sofia University).

5. **Detailed analysis of the scientific and applied achievements of the candidate contained in the materials submitted for participation in the competition**
According to the presented reference, the scientific and scientific-applied contributions in the articles submitted for the competition are grouped in five groups: Integrable Models (of nonlinear equations of mathematical physics); Robotics; Electronics and Measurement in Physics; Optics; Quantum Informatics.

The first group - Integrable Models, includes the articles: B4-J.1, B4-J.2, B4-C.3, B4-C.4, G7-J.6, G7-J.7, G7-C .3 (according to the presented reference), where scientific contributions are the derivation and study of multicomponent integrable generalizations (obtaining integrable models) of classical nonlinear equations of mathematical physics, such as the Korteweg–De Vries equation and the nonlinear Schrödinger equation.

The scientometric indicators of the articles in this group are: 5 articles with IF / SJR, and the article G7-J.6 was published in a journal with high IF - 1,488 for 2021, quartile Q2.

The scientific-applied contributions in the articles B4-C.1, B4-C.2 from the 2nd group - Robotics, are: a basic dynamic model of a walking robot with two degrees of freedom has been developed, a control algorithm is proposed, minimizing the loads of the main electric motor of the robot, an experiment was performed, and the predictions of the model coincided with the experimentally obtained results with an accuracy of 7%. Robot is used in the educational process when working with children with disabilities. Both articles in this group are with IF / SJR.

The main contributions in the articles from the third group - Electronics and Measurement in Physics, are scientific and applied and are expressed in the development and elaboration of experimental devices for measuring the Boltzmann constant [G7-J.3] and the electron charge [G7-J.5]. Appropriate modeling of operational amplifiers (standard integrated circuits) has been performed. A differential equation modeling the dynamic behavior of the amplifiers [G7-J.4, G7-C.2] is derived.

The use of measuring devices at the EPO5 and EPO6 Experimental Physics Olympiads should be highly appreciated.

The articles from the fourth group - Optics [G7-J.1, G7-J.2] have particularly high scientometric estimates, in which a method for generating non-diffraction Gauss-Bessel laser radiation is presented, and for this purpose a theoretical model has been developed to predict this phenomenon [G7-J.2]. A number of experiments have also been performed. The high Impact Factor (IF 2.125 - 2019, quartile Q2 for G7-J.1 and IF 3.998 - 2019, quartile Q1 for G7-J.1) determines the significance of the scientific contributions of the articles in this group.

In the article [G7-C.1] from the fifth group - Quantum Informatics, a (complex) formula for von Neumann's entropy is derived.

6. Critical remarks and recommendations
It is not bed if the candidate make more significant application of his theoretical knowledge of nonlinear dynamics in the field of robot dynamics.

7. Personal impressions of the candidate
I have known the candidate Alexander Alexiev Stefanov for several years as a colleague from the Department of Mechatronics, Robotics and Mechanics at FMI at Sofia University and I have very good personal impressions of him. He is an extremely positive person, always ready to help his colleagues within his competencies, including both in-depth theoretical knowledge and practical skills, for example in the field of computer technology

(the candidate studied and launched an industrial robot provided to the department by a company "Genmark Automation Inc.").

8. **Conclusion on the application**

The documents submitted for the Contest by Chief Assistant Professor Alexander Alexiev Stefanov, Ph.D., show that the teaching experience and research competencies of the applicant comply with the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADASRB), the Rules for Implementation of the ADAS in the Republic of Bulgaria (RI-ADAS in the RB) and the Rules on the Terms and Requirements for Acquisition of Scientific Degrees and Occupation of Academic Positions at Sofia University for the occupation by the candidate of the academic position "Associate Professor" in Area of Higher Education 4. Natural Sciences, Mathematics and Informatics, Professional Field 4.5 Mathematics (Mathematical modeling and application of mathematics in mechanics and robotics). I confirm that the scientific achievements meet the minimal national requirements in the Professional Field 4.5 Mathematics and no plagiarism has been detected in the scientific papers submitted for the competition.

II. GENERAL CONCLUSION

Based on the above, **I recommend to the Scientific Jury of the competition to propose to the Faculty Council of the Faculty of Mathematics and Informatics at Sofia University "St. Kliment Ohridski" to elect Chief Assistant Professor Alexander Alexiev Stefanov, Ph.D., for the academic position "Associate Professor"** in Professional Field 4.5 Mathematics (Mathematical modeling and application of mathematics in mechanics and robotics) to the Department of Mechatronics, Robotics and Mechanics at the Faculty of Mathematics and Informatics at Sofia University "St. Kliment Ohridski".

Date: 01.07.2022   Signature: ....

                                                   /Prof. Kamen Krastev Delchev/