STATEMENT

considering the procedure for

„associate professor"

in the field of4.5. Mathematics

(Mathematical modeling and application of mathematics in mechanics and robotics),

for the needs of Sofa University „St. Kliment Ohridski"(SU),

Faculty of Mathematics and Informatics (FMI),

announced in State Gazette (SG), issue 21 from 15.03.2022 and on the faculty and university websites

The statement is written by: associate prof. Ivan Nikolov Chavdarov, PhD, SU, 4.6. Informatics and computer sciences / Robotics, as a member of the Scientific Committee on the procedure, in accordance with Order No. РД-38-234/11.05.2022 of the dean of Sofia University.

The only candidate in the procedure who submitted documents is:

Assistant Professor, Aleksander Aleksiev Stefanov, PhD, SU „St. Kliment Ohridski", Faculty of Mathematics and Informatics.

I. GENERAL DESCRIPTION OF THE SUBMITTED DOCUMENTS

1. **Application information**

All the documents presented by the applicant are in accordance with the requirements ofrequired laws in republic of Bulgaria, namely: ЗРАСРБ, ППЗРАСРБ; as well with the requirements of Sofia University (ПУРПНСЗАДСУ).

In his application Aleksander Stefanov has presented a list of 16 articles in total, including 16 publications in Bulgarian and international scientific journals and scientific forums, 0 studies, 0 monographs, 0 books, 0 patents, 0 textbooks or other educational materials. Six of the publications are separated as habilitation thesis in accordance with the criteria B4 from ППЗРАС. The applicant has presented 0 other documents (in the form of employers'notes, leader of a scientific project, financing organization or project authority, recommendations, rewards or other suitable evidence) supporting the candidate's achievements. The total number of points in accordance of "The order for application of the law for development of the academic staff in republic of Bulgaria (ППЗРАСРБ)" is 168 for criteria B4 (with 100 required), 387 for criteria Г7 (with 200 required) and 56 for criteria Д11 (with 50 required) which satisfies the requirements of the applied position.

Notes and comments on the documents.

All submitted documents are in agreement with requirements and rules of SU.

2. Candidate information

Aleksander Stefanov has finished the master's degree program "Theoretical and mathematical physics" in SU „St. Kliment Ohridski", where he also successfully defends a PhD thesis titled "Nonlinear dynamical systems, related to infinite dimensional Lie algebras". From 2015 onwards he is employed as an assistant professor, and from 2017 as a chief assistant professor in the Faculty of Mathematics and Informatics at Sofia University. In parallel, he is working at the Bulgarian Academy of Sciences, Institute of Mathematics and Informatics as a research assistant on a part-time contract.

3. General character of the scientific works and contributions of the candidate

The scientific work and results of Aleksander Stefanov can be classified in three general directions:

–Research in the area of integrable models, including multicomponent generalizations of the Korteweg-De Vriez equation and nonlinear Schrodinger equation. Those works have mainly theoretical character;

-Theoretical and experimental results of the dynamics of a walking robot. The research in this area is important for the design and control of the type of robots in question. Experiments were performed using a physical prototype of the robot.

- Electronics and measurement physics. Those works are dedicated to the measurement of fundamental physical constants, in a way that is accessible for students. The main focus is the application in the educational process. Two setups are presented – for measuring Boltzmann constant and electron charge.

The results from the candidate's research have been presented at international conferences in Bulgaria and abroad. They have been published in nine articles in scientific journals and seven conference proceedings. All the presented articles are peer reviewed and indexed in well-known databases. The collection of works completely satisfies the minimal national requirements (Article 2b, Paragraphs 2 and 3 from ЗРАСРБ) and the additional requirements of SU „St. Kliment Ohridski" for the position of "associate professor" in the scientific field for the procedure. The presented scientific works were not used in previous procedures for PhD and chief assistant. There is no evidence of plagiarism.

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

The candidates teaching history is described in application 15,from where it can be seen that the candidate considerably exceeds the required teaching activities for chief assistant, and is enough for the position of associate professor.

5. Content analysis of the scientific and applied achievements of the candidate, contained in the presented materials

Seven of the presented works are dedicated to integrable models, specifically to the multicomponent generalizations of the Korteweg-De Vriez (KdV) equation and the nonlinear Schrodinger equation (NLS). Those equations find applications in the mechanics of a continuous medium, optics and other. The main contribution is the derivation of: new two component system of NLS-type equations- analogous to the Manakov model; multi-component generalizations of the modified KdV equation, which are related to Kac-Moody algebras. The recursion operators are derived, which can be used to construct the whole hierarchies of integrable equations, related to the corresponding algebras.

Two of the presented articles deal with theoretical and experimental research of a walking robot. A dynamical model is developed. With its help a suitable control algorithm is suggested, which aims to minimize the motor load during walking.

Seven articles are dedicated to electronics, optics and measurements physics. A new method and experimental setup are developed for the generation of Gauss-Bessel beam by annihilation of optical vortices. A suitable theoretical framework is also developed, which predicts the desired effect. A new method is presented for the measurement of Boltzmann's constant, entirely by electrical measurements. An experimental setup for the measurement of the electron's charge from Shotky noise is presented. The setup uses a specially developed electronic circuit, which finds practical applications.

The first group of articles has scientific contributions related to the enrichment of already existing knowledge. The second and third groups find applications in real world situations. A part of the third groups takes a look at new hypothesis and methods.

The works are presented in articles published in journals or proceedings of international conferences, 16 in total. They can be divided according to their citation parameters:Q1 –1 articles; Q3 – 2 articles;Q4 – 4 articles; SJR no quartile –7; Peer-reviewed and indexed without SJR/IF – 2. The articles are co-authored, where I have assumed that each author has the same contribution. The list of citations contains 11 entries, 7 of which are in journals indexed in Scopus and Web of Science. Those parameters show the high value of the presented scientific works.

6. Critical notes and recommendations

I recommend that in the future all theoretical results to be reinforced with practical applications, where possible. I would also recommend that more focus should be put on the geometrical interpretation of any new theoretical results.

7. Personal impressions about the candidate

I have known Aleksander Stefanov since 2017, and I have excellent impressions about his professional work. Besides that, I can point out his correctness, communicativeness, and his teamwork abilities, which he has proved during his time in the Mechatronics, Robotics and Mechanics department. Those are important qualities for a teacher.

8. Conclusions about the application

After reviewing the documents and scientific materials presented in the procedure, based on the analysis of their importance and the contained scientific contributions, I **concur** that the scientific achievements fulfill the requirements ofthe Law for Development of the Academic Staff in theRepublic of Bulgaria (ЗРАСРБ), the order of its application, and the corresponding rules of Sofia University „St. Kliment Ohridski“, for the academic position of "associate professor" in the scientific field of the procedure. In particular, the candidate fulfills the minimal national requirements in that field and no evidence for plagiarism has been found in the presented scientific works.

I give my **positive** evaluation of the candidate.

II. GENERAL CONCLUSIONS

Based on the above, I **recommend** that the scientific jury suggests to the competent authorities of choice in the Faculty of Mathematics and Informatics, SU „St. Kliment Ohridski“, to choose Aleksander Aleksiev Stefanov for the academic position of "associate professor" in the scientific field 4.5. Mathematics (Mathematical modeling and application of mathematics in mechanics and robotics),

Sofia, 30.06. 2022 г.   Written by:Associate ProfessorIvan Chavdarov, PhD