REVIEW

According to a competition for the academic position "Associate Professor"

announced by University "Prof. Asen Zlatarov" Burgas

Candidate: Ch. Assistant Professor Stancho Valkanov Pavlov, PhD

Reviewer: Prof. Dr. Galina Stoyanova Panayotova

I. General information

1. Prepared the review - Prof. Galina Stoyanova Panayotova is a professor in the field of higher education 4. Natural sciences, mathematics and informatics, professional direction 4.5 "Mathematics" ("Mathematical modeling"), head of the department "Computer Sciences" at the FIN of UniBIT and Department of "Mathematics and Physics" at the University "Prof. Asen Zlatarov" Burgas. Entered in the register of the academic staff of the Republic of Bulgaria and the National Center for Information and Documentation /NACID/.

2. Reason for writing the review - order of the Rector of the University "Prof. Asen Zlatarov" Burgas, No. RD - 292/19.09.2022 and decision of the scientific jury dated 4.10.2022 (Protocol 1)

II. Information about the competition - The competition for the academic position " Associate Professor" is in the field of higher education 4. Natural sciences, mathematics and informatics, professional direction 4.5 "Mathematics" (Higher Mathematics). The competition was announced in SG No. 45/17.06.2022 for the needs of the Department of Mathematics and Physics at the University of Prof. Asen Zlatarov" Burgas.

III. Candidate for the competition - In the competition for occupying the academic position "docent" as the only candidate participated Chief Assistant Professor Stancho Valkanov Pavlov Department of "Mathematics and Physics" at the University "Prof. Asen Zlatarov" Burgas.

IV. Review for the occupation of the academic position "associate professor" by the candidate Chief Assistant Professor Stancho Valkanov Pavlov, PhD

1. Information about the candidate

Biographical data

Chief Assistant Professor Stancho Pavlov was born in Burgas in 1958. He graduated from "Nikola Obreshkov" secondary school in his hometown and higher education at Plovdiv University "Paisiy Hilendarski"; major: Mathematics in 1981. He worked for 2 years as a programmer in a computing center, and from 1982 to 1989 he worked as a teacher at the "Nikola Obreshkov" PMG, Burgas. From 1998 to the present, he has been working as Chief Assistant Professor of Mathematics at the Department of "Mathematics and Physics" at the University "Prof. Dr. Asen Zlatarov", Burgas.

Since 2015, he is a doctor in Professional field 4.6 "Informatics and computer sciences"

Scientific interests

His scientific interests are in the field of information technology, programming, computer simulations, research of dynamic systems, mathematical theory of catastrophes, etc.

Chief Associate Professor Stancho Pavlov participated in the development of 15 internal university research projects. At the "Laboratory of Mathematical Chemistry" he took part in the development of a computer program for determining geometrical characteristics of complex molecules of organic compounds under two international treaties.

Pedagogical activity

Chief Assistant Professor Stancho Pavlov leads seminars on "Higher Mathematics Part 1 and Higher Mathematics Part 2" for bachelor students from all majors at the University "Prof. Dr. Asen Zlatarov" and Technical College, Burgas. Leads seminar classes in mathematics for foreign students.

He maintains a website with over 300 pages published on it, covering the material he teaches, without being limited to the material included in the disciplines. Its volume is 3 gigabytes. The site is supported by a popular science and scientific magazine. In the reference for Teaching and methodical work, he attached part of the sections of the site and the titles of its pages.

Three textbooks on Higher Mathematics - first, second and third parts and one book entitled "Remarkable Curves" have been published. He applied their contents.

The presented factology is an objective testimony of the multifaceted and active educational activity of Chief Assistant Professor Stancho Pavlov. It gives me reason to believe that the pedagogical activity of the candidate fully corresponds to the requirements for holding the academic position of "associate professor".

2. General description of the presented materials

22 scientific publications were submitted for participation in the competition (Appendix 1), of which 4 in referenced and indexed in world-famous scientific information databases (Scopus) (Indicator B 4.) - 4 in non-refereed journals with scientific review Appendix 1 (Indicator D *7-18. 32 citations in scientific works (Appendix 4), two participations in an international scientific or educational project and 15 participations in topics developed in the NIS of the University "Prof. Dr. Asen Zlatarov", Burgas (item 9 of the attached documents). The obtained results and the created program products are implemented in practice.

Certificate of patent filed on 08.12.2018, registered under application No. 112845 for the invention "Combined bridge" with inventors Stancho Pavlov and Dimo Yanev. The indicated indicators are in accordance with the declaration of minimum number of indicator points.

3. General characteristics of the candidate's scientific-research and scientific-applied activities

The main scientific and scientific-applied contributions of Chief Assistant Professor Stancho Valkanov Pavlov are in the field of mechanics and materials science. Research can be divided into several main groups:

• Biological modeling in plants.

The possibilities for modeling the stress state in plants are considered. The study shows the possibility of applying artificial intelligence methods in eco-physiological studies. It provides a rapid tool that will contribute to the knowledge needed to develop strategies that would help reduce the impact of environmental stress in agriculture and forestry.

A total of 2 scientific publications have been published in this direction, of which 1 is in editions referenced and indexed in world-renowned databases with scientific information (https://www.scopus.com/authid/detail.uri?authorId=57204365107) [B4. (2)] and 1 in referenced https://www.researchgate.net/publication/309771032_Artificial_neural_networks_for_evaluating_nitroge n_content_in_leguminous_plants, from Appendix 1.

• Digital methods finding applications in physics and chemistry.

Porous materials and especially ceramics have recently attracted the attention of many researchers. This is related to their diverse applications as catalyst carriers, filters, parts of separation systems, bio-implants, etc. Porous ceramics are of particular importance due to their use for filtration and the production of ceramic membranes. There is another important parameter characterizing the porous structure and it is related to surface fractal analysis and the value of the area describing the fractal dimension. Surface fractal analysis allows the characterization of surface roughness or the parameter reflecting the roughness of the porous structure. In this regard, the aim of the reported research is to determine the fractal dimension of the surface of porous ceramic materials and to find a relationship between it and some basic physico-mechanical properties such as hardness and modulus of elasticity. Two articles have been published. The first is using fractal dimension, and the second is using one-dimensional Fourier analysis.

A model is proposed for a thin film powder coating on a wafer resulting from particle emission from a point source. In this direction, the contributions can be summarized as follows:

- The porous structure of carbonized materials from agricultural activity was studied;
- A computer model of an electric field generated by stationary charges was developed;
- An analysis of the behavior of dynamic risk technical systems was performed;
- A method for atomic absorption analysis that does not need a light source has been developed. A computer program was prepared for statistical processing and presentation of the results;
- A method has been developed for molecular absorption analysis in the visible spectrum, in which monochromatic light is not needed to measure absorption. Instead, the color of the test solution is derived from an image captured by a digital camera, which is transferred to a computer. The characteristics (RGB) of the color are determined. Polynomial regression was used to determine the relationship of the tristimulus (RGB) values with the unknown concentrations.
- An optical method for quantitative analysis of sediment concentration based on digital image analysis was developed. The average color of the solution is determined from it, and the concentration of the solute can be judged from there.

A total of 3 scientific publications have been published in this direction, of which 3 in editions, referenced and indexed in world-famous databases with scientific information (SCOPUS)

[B4.(2,3,4)] and 8 on the platform https://www. researchgate.net/publications [D*7.(1,3,4,5,6,12, 14,16,18)] from Appendix 1.

• Software programs and computer simulations of catastrophes

From the very beginning, the theory of catastrophes has tried to answer the question, why when some parameters of dynamic systems change smoothly, they suddenly qualitatively change their dynamics. Catastrophe theory methods help determine the sensitivity of the critical or failure load to both structural imperfection and dynamic action. Moreover, they prove effective in studying the composite systems for which different forms of failure are possible.

Scientific and applied contributions in this direction are;

The variety of "catastrophes" has been studied in a mathematical and informational aspect;

- An addition was made to Henry Whitney's topology in the sense of investigating the stability of functions from the point of view of group theory;
- The mathematical concept of "infititesimial stability" was analyzed from the point of view of de Maser's algorithm;
- The potential mathematical function in the practical theory of catastrophes (PTK) was analyzed;
- Information-mathematical models of Euler rod buckling and arch cracking were created;
- The change of the type of resistance of the dynamic risk systems was studied;
- The sensitivity to imperfection of a composite mechanical system was investigated;
- A mathematical approach for engineering optimization was created. • A mechano-mathematical model of support brackets has been synthesized.

A total of 2 scientific publications have been published in this direction, which are indexed in world-renowned databases with scientific information on the platform https://www.researchgate.net/publication [D*7.(10,17)] from Appendix 1.

• Other directions

Chief Assistant Professor Stancho Valkanov Pavlov is a scientist with interests in various fields. The most impressive of them are:

- Development of science and education;
- Interaction with other cultures;
- General religion;
- Common language;
- Maintaining military strength, etc.

A total of 2 scientific publications are published here, which are indexed in world-renowned scientific information databases on the platform https://www.researchgate.net/publication [D*7.(2, 9, 13, 15)] from Appendix 1.

4. Evaluation of the presented works

I evaluate the candidate's scientific and scientific-applied works as fully corresponding to the scientific specialty announced in the competition. Chief Assistant Professor Stancho Valkanov Pavlov has submitted significantly more materials than are required for the academic position of "associate professor".

According to the declaration of number of points in direction 4.5 Mathematics, Ch. Dr. Stancho Valkanov Pavlov meets the minimum national requirements (MNI) with a calculated score of 792 points. According to indicator D, Stancho Pavlov has calculated 282 points. Let's keep in mind that the articles that are in G7 - and others are indexed with 6 points each, and not with 4 as the candidate indexed them. 18 posts with 2 points each = 36 points. The total score for Indicator D is 318 points. With these points, Stancho Pavlov meets the requirements of the Regulations of the University "Prof. Asen Zlatarov" Burgas for associate professor.

5. Notes and recommendations

Some critical recommendations and remarks could be addressed to the presented documents of Stancho Pavlov.

- Incorrectly organized documents;
- Errors in the indexing of individual publications and citations, etc.

The remarks made do not diminish the value of the developments.

6. Personal impressions

As a colleague, I can appreciate Stancho Pavlov as a well-rounded scientist, with creative thought and flair, a good experimenter, precise and very persistent in his work. The obtained results and the created program products are implemented in practice.

During the many years of working together in the "Mathematics and Physics" department, I would also add to the mentioned qualities an affinity for scientific research, a desire for self-improvement and ambition. He lacks responsibility.

The above is a convincing proof of the very high level of his participation in the current contest.

Conclusion

Based on the acquaintance with the presented scientific works, their importance, the scientific-applied and applied contributions contained in them, I find it reasonable to propose Ch. Assistant Professor Dr. Stancho Valkanov Pavlov to take the academic position "Associate Professor" in professional direction 4.5 "Mathematics" (Higher Mathematics) at the Department of Mathematics and Physics at the University "Prof. Asen Zlatarov" Burgas.

Date: 02.11.2022

Reviewer:
/Prof. Dr. G. Panayotova/