OPINION

in a competition for the academic position of "PROFESSOR" in: the field of higher education 5.2 "Electrical engineering, electronics and automation", course "Management of technological processes" at the department "Automation" of Faculty of Computer Sciences and Automation
announced in the State Gazette No. 14 / 16.02.2024

with candidate: Assoc. Prof. Eng. Nikola Nikolaev Nikolov, PhD from Automatation Department, Faculty of Computer Sciences and Automation, Technical University of Varna

Member of the scientific jury: Prof. Eng. Milena Nikolova Mileva-Karova, PhD,

1. General characteristics of the research and applied research activities of the candidate

The documentation submitted by the candidate, Associate Professor Nikola Nikolov, is in the required volume and complies with the Law on the Development of the Academic Staff and the Regulations on the Terms and Conditions for Occupying Academic Positions at TU-Varna. The documentation is clearly designed and arranged.

Assoc. Prof. Dr. Eng. Nikola Nikolov is the unique candidate for the academic position "PROFESSOR". He graduated from the Master's level in "Automation" department" at TU-Varna, a doctorate by code 02.21.08. "Automation" with thesis topic: "Investigation of Algorithms for the Synthesis of Modal Adaptive State Regulators". Since 1990, he has successively held all positions: assistant, senior assistant, chief assistant and associate professor in the "Automation" department at TU-Varna.

Assos. Prof. Nikola Nikolov has very good organizational skills. For the third term, he was elected as the head of the "Automation" department. He is the chairman of the National Organizing Committee of the International IEEE Conference on Automation and Informatics (ICAI) - 5 years. He is the head of the "Marine Robotics" section at the National Center for Mechatronics and Clean Technologies - for more than 6 years. He is the Chairman of the Automation and Informatics Union "John Atanasov" and he is a member of the editorial board of the Automation and Informatics magazine (2020-2024). Internationally, he is a member of the IEEE and a member of the technical committee of IFAC (International Federation of Automatic Control) on Marine Systems (TC 7.2 on Marine Systems).

The candidate's research and scientific-applied activity is represented by a reference to the scientific publications that the candidate has submitted according to the groups of indicators required to meet the uniform national minimum requirements for the academic position of "PROFESSOR".

The minimum requirements for the group of indicators of category "A" (min. 50 points) are covered by the doctoral dissertation of the candidate (total 50 points).

The minimum requirements for the group of indicators of category "B" (min. 100 points) are met by submitting ten publications (total 183 points) in refereed publications indexed in SCOPUS. These publications are thematically united as "Control and management of technological processes and devices" and are equivalent to a habilitation thesis.

The minimum requirements for the group of indicators from category "D" (min. 200 points) are met by submitting a total of 20 publications (total 244.7 points), respectively 11 publications in SCOPUS (total 157.9 points) and 9 publications (total 86.8 points), representing scientific publications in non-refereed peer-reviewed journals or in edited collective works. These 20 publications are thematically united in 4 main thematic areas: "Algorithms for adaptive monitoring", "Automatic control systems", "Communication networks in control systems" and "Engineering practices in marine resource management".

The minimum requirements for the group of indicators of category "D" (min. 100 points) are covered by referring to 9 (all in refereed publications) citations (total 180 points). In the SCOPUS database, there are 31 citations to the author's publications for the last 5 years, excluding self-citations by all authors of the respective publications.

The minimum requirements for the group of indicators of category "E" (min. 150 points) are covered by referring to documents for all subcategories (total 270 points). The active participation in national and international projects of high social importance in the form of participation, project management or attracting funds for projects is impressive (703300 BGN were raised for the "National Center for Mechatronics and Clean Technologies" project).

9. A two-step procedure was developed using the method of least squares and introducing an instrumental variable to simultaneously determine the three unknown parameters of biological objects in the von Bertalanffy equation. [D.7.5.]
10. A detailed analysis of 3 types of models for describing the length-weight relationship of biological objects was carried out: linear, polynomial and non-linear, and their qualities were investigated. [D.7.6.]
11. The normal frequency distribution of experimentally taken growth frequency samples of two types of biological objects from the Bulgarian part of the Black Sea has been proven, by combining a direct statistical method (Pearson's Chi-square test) and indirect methods for testing statistical hypotheses for normality distribution of a random variable. [D.8.3.]
12. A thorough study was made and recommendations were developed for determining the number of intervals when splitting the sample to test the hypothesis of normal distribution of data in representative samples for n>200, and the influence of errors in determining the distribution law was established. [D.8.4.]

Applied Contributions

1. A technological scheme and algorithm for managing a combined local system for joint purification of drinking water from iron and arsenic with limitation of the level of harmful substances in the washing water was developed. [Q.4.5.]
2. Resource tests were made on a roller mill and vertical washing machines, the experimental data were processed and measures for technical monitoring and diagnostics of the equipment were proposed. [Q.4.9.]
3. A variant for controlling the thrusters of a remotely operated underwater vehicle ROV using a discrete modal state controller is proposed. [Q.4.10.]
4. A schematic solution of a two-position SISO object control system adapting to disturbances is developed. [D.7.8.]
5. Variants of control systems with PLC-based state regulators are proposed. [D.8.7., D.8.9.]
6. On the basis of the application of the cybernetic approach, a block diagram of the system for managing the stock of BO in conditions of uncertainty when using a safety approach is proposed. [D.8.5., D.7.1., D.7.2.]
7. A MATLAB-based stand-alone application was developed specifically for the purpose of the fish stock assessment procedure. [D.8.6.]

A large part of Assoc. Prof. Nikola Nikolov's contributions are his personal work and there are the result of his extremely activity in national research projects, thereby contributing to the growth of the university as a modern scientific and applied center.

Extremely active as the Head of the "Marine Robotics" section at the "National Center for Mechatronics and Clean Technologies", he is one of the creators of this scientific field at TU-Varna.

4. Significance of contributions to science and practice

The candidate's scientific output has been presented at authoritative scientific forums. For the "PROFESSOR" procedure, the candidate is the author and co-author of 30 presented scientific publications, distributed as follows: scientific publications in publications that are referenced and indexed in world-renowned databases with scientific information - 21 and scientific publications in non-refereed journals with scientific review or in edited collective volumes – 9. 23 scientific publications in refereed editions and 31 citations are observed in the Scopus database.

This shows that Associate Professor Nikola Nikolov has published significant results and won recognition in scientific circles. A Scopus Hirsch Index h-index = 4, a membership in professional organizations such as IEEE and IFAC, the chairmanship of the Union of Automation and Informatics - "John Atanasov", a membership in scientific juries for awarding academic titles, a membership in international organizational and program committees of scientific conferences, are vivid proof of this.

5. Critical remarks and recommendations

From the review of the candidate's scientific works, I find no reason to express critical remarks. I have a recommendation that he continue to publish the results of his research in indexed databases and in scientific journals with an impact factor.

The minimum requirements for the group of indicators of category "G" (min. 120 points) are covered by the lecture courses led by the candidate (600 in total).
Associate Professor Nikola Nikolov meets and exceeds the required minimum national requirements for holding the academic position "PROFESSOR" at TU-Varna.

2. Evaluation of the pedagogical preparation and activity of the candidate.

Associate Professor Nikola Nikolov has been working at TU-Varna since 1990. He has been actively involved in all levels of university studies for the past 3 years. He led 7 lecture courses with 1195 lecture hours at the "Bachelor" level, 1 lecture course with 90 lecture hours at the "Master" level. For his entire teaching activity at TU-Varna, Assoc. Prof. Nikolov is the supervisor of more than 50 graduate students, a reviewer of more than 50 diploma theses and a member of the diploma and state examination committee. He supervised 4 PhD students: one defended, two were dismissed with the right to defend and one is in the process of training.
The candidate's experience as a long-term teacher at the higher educational institution, membership in various scientific juries, the award "Golden badge of FNTS for personal contribution and merit in the activity of FNTS", experience in the management of specialized laboratories, give reason to emphasize that the candidate is established specialist in his professional field with high scientific, pedagogical and methodical qualifications.

3. Main scientific and applied contributions

I accept the scientific, scientific-applied and applied contributions formulated by Assoc. Prof. Nikolov as follows:

Scientific contributions

1. An algorithm for modal control (SMC) of one-dimensional (SISO) linear steady state discrete systems is developed, which calculates the elements of the feedback vector for a SISO system with a modal discrete state controller such that the poles of the closed system simultaneously satisfy the requirements for degree of stability, degree of fluctuation of the transient processes in the discrete system and not to be multiples. [Q.4.1.]
2. An algorithm with reduced computational complexity is developed for the initial estimation of the parameters of SISO linear stationary discretes. [D.7.7.]

Scientific and applied contributions

1. 2 adaptive structures of control systems with a modal state regulator have been developed, which during adaptive monitoring are controlled by the purpose-built relay-pulse regulator. [Q.4.2., Q.4.3.]
2. A control system structure based on a modal state regulator with an integrating component and a direct connection to an inverse model is developed. [Q.4.4.]
3. A methodology is proposed for measuring the attenuation and phase shift of the electromagnetic wave when measuring moisture and thickness of bulk materials from the agro-industrial complex. [Q.4.6., Q.4.7., Q.4.8.]
4. 2 non-recursive algorithms for estimating the initial and current state vector of SISO linear stationary discrete systems based on the method of least squares and the method of instrumental variables are developed. [D.7.3., D.7.10.]
5. A recursive algorithm for adaptive monitoring of SISO linear stationary discrete systems was developed, developed on the basis of the recursive extended method of least squares, and a library for recursive evaluation was created [D.7.4., D.7.11.]
6. Multi-model modal control of nonlinear SISO system based on Takagi-Sugeno fuzzy controller is synthesized. [D.8.2.]
7. A variant of the Smith-predictor system is developed for long-delay object control through a state controller. [D.8.8.]
8. A lightweight underwater network architecture (LUNA) is developed for remote control communication of a tethered underwater ROV vehicle. [D.7.9.]

CONCLUSION

In the presented scientific works, there are enough original scientific, scientific-applied and applied contributions that have received international recognition. Assoc. Prof. Nikolov is an authoritative teacher and leader. Based on the acquaintance with the presented scientific works, their importance, the scientific, scientific and applied contributions contained in them, I find it reasonable to propose Assoc. Prof. Dr. Eng. Nikola Nikolaev Nikolov to take the academic position "PROFESSOR" in the professional field 5.2 "Electrical engineering, electronics and automation", course "Management of technological processes" at the department "Automation" of Faculty of Computer Sciences and Automation.

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