R E V I E W

by competition for the academic position "Professor"
in the field of higher education 5. Technical sciences,
professional area 5.2. Electrical engineering, electronics and automation,
study discipline "Management of technological processes",
announced in SG no. 14 of 16.02.2024

with candidate: **Assoc. Prof. Nikola Nikolaev Nikolov, PhD**

Reviewer: **Acad. Vassil Stoyanov Sgurev, DSc**

1. General and biographical data

Assoc. Prof. Nikola Nikolaev Nikolov was born on May 26, 1960 in Kazanlak. He completed his higher education in 1989 at VMEI - Varna, Faculty of Electronics and Automation, Automation Department, with the Master's Degree in Electronics and Automation Engineering. In 1990, he started working as an assistant at VMEI - Varna, Faculty of Electronics and Automation, Automation Department.

In 2009, he acquired the PhD degree on the doctoral program 02.21.08. Automation, for the defense of a PhD thesis titled "Investigation of algorithms for the synthesis of modal adaptive state regulators". Since 2013, he holds the academic position of Assoc. Prof. in professional direction 5.2. Electrical Engineering, Electronics and Automation, scientific specialty "Automation". Since 2016, he has been the head of the Automation Department at the TU-Varna.

Assoc. Prof. Nikola Nikolaev Nikolov is the only candidate in the current competition, announced on the basis of Art. 32, para. 1, item 1. of ZVORB, Art. 4, para. 2 of ZRASRB, Art. 30, para. 2 of PUZAD in TU-Varna and Decision of the FS of FITA - Protocol No. 15 of 01.04.2024.

2. General description of the presented materials

By order No. 242 of 17.04.2024 of the Rector of the TU-Varna, I have been included in the composition of the scientific jury and I have received the following documents according to the procedure:

1. Application to The Rector for admission to the competition;
2. Announcement in the Official Gazette;
3. Curriculum vitae (CV European sample);
4. Diploma for educational and scientific doctorate degree;
5. The diploma for Associate Professor;
6. Labor contract for borrowing of Associate Professor;
7. Reference for performance on the minimum national requirements for borrowing on the academic position specified in the regulations by applicable groups indicators;
8. Reference for the original scientific contributions;
9. Summaries on the scientific the works participating in the competition (at Bulgarian language);
10. Summaries on the scientific the works participating in the competition (at English language);
11. Contest Related scientific works;
12. Declaration for credibility on provided information;
13. Declaration for originality;
14. Declaration for plagiarism;

15. Others connected documents proving scientific, teaching and/or implementing activity by Art. 22, para. 2 and para. 3 of PURZADTUV and Art. 27(4) of ZRASRB and Art. 57a (2) of PPZRASRB:

a) Reference for the study load;

b) Reference for guide on doctoral students;

c) Reference for membership in scientific organizations and scientific forums;

d) Reference for participation in scientific jury.

According to the presented report on the quantitative indicators, the criteria for occupying the academic position "Professor" have been met, and in some groups of indicators the candidate significantly exceeds the minimum requirements.

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

The scientific research and applied scientific activity of the candidate is expressed in the scientific production with which he participates in the competition for the academic position "Professor".

Assoc. Prof. Nikola Nikolov participated in the competition with 30 scientific publications, of which 21 are in editions which are referenced and indexed in World famous bases data with scientific information and 9 publications are in unreferenced journals with scientific reviewing or in edited collective volumes. A list of 18 citations in publications indexed and referenced in Scopus and/or Web is presented of Science.

In the list of posts by the contest are presented 10 scientific publications, equivalent to habilitation labor, in the direction "Control and management on technological processes and devices". Introduced there are also 20 scientific publications in the thematic directions – "Algorithms for adaptive monitoring", "Systems for automatically management", "Communication networks in systems for management" and "Engineering practices at management on the marine resources".

The candidate is the head of three scientific research projects and a member of the team of three scientific research projects. In project No. BG05M20P001-1.001-0008 "National Center for Mechatronics and Clean Technologies", in the Laboratory "Robotic Mechatronic Technologies" he is the head of Section L11S3 "Marine Robotics". The funds raised for this project are BGN 703,300.

Assoc. Prof. Nikola Nikolov fulfills the requirements for occupying the academic position "Professor", according to indicator C, with a required number of 100 items, the candidate's data is 183 items, according to indicator D, with a required number of 100 items, are presented data for 180 items and according to indicator E, with a required number of 150 items, data for 270 items are presented.

4. Assessment of the candidate's pedagogical training and activity.

According to indicator J.29. Horary of lectures given at TU-Varna for the last three years, with a required number of 120 points, is the presented reference for 600 points.

The candidate has submitted a study load report, during the last three academic years 2021/2022, 2022/2023 and 2023/2024, according to which he has conducted classroom learning activity of 1046.8 hours of lectures and outside classroom learning activity of 148.7 hours. The total educational activity for the period is 1195.5 hours.

Assoc. Prof. Nikola Nikolov supervised four doctoral students, one of whom successfully defended his dissertation, two were dismissed with the right to defend and one is in the training period.

5. Basic scientific and scientific-applied contributions.

The presented reference for scientific contributions includes 10 scientific publications, equivalent to a habilitation work - monograph (section C.4.), which are united under the general topic “Control and management of technological processes and devices”.

The contributions related to the publications in section C.4. are defined as:

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. 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.]

3. A control system structure based on a modal state controller with an integrating component and a direct connection with an inverse model is developed. [Q.4.4.]

4. 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.]

5. 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.]

6. 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.]

7. A variant for controlling the thrusters of a remotely controlled underwater vehicle ROV using a discrete modal state controller is proposed. [Q.4.10.]

20 scientific publications, other than those equivalent to a habilitation work - monograph (sections D.7. and D.8.), are presented, which are summarized in four main thematic areas.

The contributions related to the publications in the relevant thematic direction are formulated as:

I. Algorithms for adaptive monitoring

1. A reduced algorithm was developed computational complexity for elementary assessment on the parameters of SISO linear stationary discreet systems - based on the method on the smallest squares. [D.7.7.]

2. Developed are two the algorithm for assessment on initial and current vector on the condition of SISO linear stationary discreet systems, based on the method on the smallest squares and the method on the instrumental variables. [D.7.3., D.7.10.]

3. An algorithm was developed for adaptive monitoring of SISO linear stationary discreet systems, developed on the base on extended method on the smallest squares and is created library for evaluation. [D.7.4., D.7.11.]

II. Systems for automatically management

1. It is developed schematically answer on two-position system for management on SISO object , adapting everything to disturbances. [D.7.8.]

2. It is synthesized multi-model modal management on non-linear SISO system based of Takagi-Sugeno fuzzy regulator. [D.8.2.]

3. A variant has been developed of Smith- predictor system for management on objects with a large delay through regulator on the condition. [D.8.8.]

4. Proposed are options on systems for PLC- based control regulators on the condition.

III. Communication networks in systems for management

1. It is designed to be lightweight underwater network architecture (LUNA) for communication at remotely management on attached underwater transportation means ROV. [D.7.9.]

IV. Engineering practices at management on the marine resources

1. It is developed two-step application procedure on the method on the smallest squares and input on instrumental variable for at the same time determination on the three unknown the parameter on the biological objects in the equation on background Bertalanfi. [D.7.5.]

2. A detailed is performed analysis of 3 types models for description on the connection length-weight on the biological objects: linear, polynomial and non-linear and are investigated the qualities them. [D.7.6.]

3. The normal is proven distribution on frequencies at experimentally taken off growth frequency samples on two the species biological objects from Bulgarian part on black sea, like are combined direct statistically method (Chi-square criterion on Pearson) and the indirect methods for checking on statistically hypotheses for normal distribution on accidental magnitude. [D.8.3.]

4. It's done thoroughly research and are developed recommendations for determination on count on the intervals at smashing on the sample for checking on the hypothesis for normal distribution on data in representative samples for number on the data n>200 and it is established the influence on the mistakes at determination on the law on distribution. [D.8.4.]

5. On base on the application on the cybernetic approach is proposed blocky scheme on the system for management on the stock from BO in the conditions on uncertainty at use on protected approach. [D.8.5., D.7.1., D.7.2.]

6. Developed MATLAB based independently application, specially developed for the goals on the procedure for assessment on the fish stocks. [D.8.6.]

All listed above contributions are classify us by the candidate by the following way:

Scientific contributions

1. An algorithm was developed for modal management (SMC) of one dimensional (SISO) linear stationary discreet systems which calculates the elements on the vector on the opposite connection for SISO system with modal discreet regulator on the condition so that the poles on the closed one system Yes satisfy at the same time the requirements for degree on resistance, degree on hesitancy on the transitory processes in the discrete system and yes no are multiples. [Q.4.1.]

2. A reduced algorithm was developed computational complexity for elementary assessment on the parameters of SISO linear stationary discrete. [D.7.7.]

Scientific and applied contributions

1. Developed are 2 adaptive structures on systems for management with modal regulator on the state which by time on the adaptive monitoring everything manage from the created for the goal relay-pulse regulator. [Q.4.2., Q.4.3.]

2. A structure is developed on system for management based on modal regulator on the state with integrating ingredient and direct relationship with inverse model. [Q.4.4.]

3. A methodology is proposed for measurement on attenuation and phase displacement on electromagnetic wave at measurement on moisture and thickness on bulk materials from agro-industry complex. [Q.4.6., Q.4.7., Q.4.8.]

4. Developed are two the algorithm for assessment on initial and current vector on the condition of SISO linear stationary discreet systems, based on the method on the smallest squares and the method on the instrumental variables. [D.7.3., D.7.10.]

5. An algorithm was developed for adaptive monitoring of SISO linear stationary discreet systems, developed on the base on extended method on the smallest squares and is created library for evaluation. [D.7.4., D.7.11.]

6. It is synthesized multi-model modal management on non-linear SISO system based of Takagi-Sugeno fuzzy regulator. [D.8.2.]

7. A variant has been developed of Smith- predictor system for management on objects with a large delay through regulator on the condition. [D.8.8.]

8. A light has been developed underwater network architecture (LUNA) for communication at remotely management on attached underwater transportation means ROV. [D.7.9.]

9. It is developed two-step application procedure on the method on the smallest squares and input on instrumental variable for at the same time determination on the three unknown the parameter on the biological objects in the equation on background Bertalanfi. [D.7.5.]

10. A detailed is performed analysis of 3 types models for description on the connection length-weight on the biological objects: linear, polynomial and non-linear and are investigated the qualities them. [D.7.6.]

11. The normal has been proven distribution on frequencies at experimentally taken off growth frequency samples on two the species biological objects from Bulgarian part on black sea, like are combined direct statistically method (Chi-square criterion on Pearson) and the indirect methods for checking on statistically hypotheses for normal distribution on accidental magnitude. [D.8.3.]

12. It is done thoroughly research and are developed recommendations for determination on count on the intervals at smashing on the sample for checking on the hypothesis for normal distribution on data in representative samples per item on the data n>200 and it is established the influence on the mistakes at determination on the law on distribution. [D.8.4.]

Applied contributions

1. It is technologically developed scheme and algorithm for management on combined local system for jointly purification on drinkable water from iron and arsenic with limitation on the level on harmful substances in the sink water. [Q.4.5.]

2. Done are resourceful tests on rolling mill and vertical washing machines, processed are the experimental data and are proposed measures for technically monitoring and diagnostics on the equipment. [Q.4.9.]

3. A variant is proposed for management on the trusts on remotely manageable underwater ROV apparatus with the help on discreet modal regulator on the condition. [Q.4.10.]

4. It is developed schematically answer on two-position system for management on SISO object, adapting everything to disturbances. [D.7.8.]

5. Proposed are options on systems for PLC-based control regulators on the condition. [D.8.7., D.8.9.]

6. On base on the application on the cybernetic approach is proposed blocky scheme on the system for management on the stock from BO in the conditions on uncertainty at use on protected approach. [D.8.5., D.7.1., D.7.2.]

7. Developed MATLAB based independently application, specially developed for the goals on the procedure for assessment on the fish stocks. [D.8.6.]

I accept the contributions formulated by Assoc. Prof. Nikola Nikolov in the works with which he participates in the competition, and the results have a scientific, scientific-applied and applied nature.

6. Significance of contributions to science and practice.

The significance of the contributions to science and practice is indisputable. The predominant part of the candidate's works has practical application in various fields.

The quantitative indicators of the criteria for occupying the academic position “Professor” have been met, and in some groups of indicators the candidate significantly exceeds the minimum requirements.

As an additional criterion to the national requirements, TU-Varna has specified group J - for lectures conducted in the last three years. According to this criterion, the candidate significantly exceeds the required minimum. Below are the quantitative data for the applicant's performance.

no	Indicators by groups	National requirements	Applicant data
1	Group indicators A	50	**50**
2	Group indicators IN	100	**183**
3	Group indicators D	200	**244.7**
4	Group indicators D	100	**180**
5	Group indicators E	150	**270**

7. Critical notes and recommendations.

The following notes and recommendations can be made on the materials presented in the competition:

1. The description of contributions is fragmented. They should be consolidated for greater clarity of claims.

2. Some of the algorithms presented are part of models in which these algorithms are used, model contributions should be claimed.

3. The problems of the computational complexity of the proposed algorithms are not discussed in the works, and this is very important.

I recommend the candidate to focus his efforts on publications in refereed international journals.

8. Personal impressions and opinion of the review.

I know Assoc. Prof. Nikola Nikolov from his membership in the "John Atanasoff" Union of Automation and Informatics. With his professional qualities, he earned the respect of his colleagues and was elected Deputy Chairman of SAI. In 2023, he was awarded a gold badge of the FNTS for personal contribution and merit in the activities of the Federation and its associations.

CONCLUSION

Based on the acquaintance with the presented scientific works, their importance, the scientific, scientific-applied and applied contributions contained in them, I find it reasonable **to propose** Assoc. Prof. Nikola Nikolaev Nikolov to occupy the academic position of "Professor" in scientific field 5. technical sciences, professional direction 5.2. Electrical engineering, electronics and automation, study discipline "Management of technological processes".

Date: 17/06/2024 **REVIEW**

Заличена информация
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