R E V I E W

by **Prof. Lyubka Atanasova Doukovska, PhD, DSc**

from the Institute of Information and Communication Technologies,

at the Bulgarian Academy of Sciences,

on the Competition for the academic position "**Professor**",

under the Scientific Field: 4. Natural Sciences, Mathematics and Informatics,

the Professional Area: 4.6. Informatics and Computer Sciences,

the Scientific Specialty: 01.01.12. Informatics,

for the needs of the Modeling and Optimization Department

of the Institute of Information and Communication Technologies - BAS,

announced in Darjaven Vestnik No. 41 of 21.05.2019

with a participant - **Associate Professor Vladimir Vasilev Monov, PhD**

In accordance with Order No. 181 of July 19, 2019 of the Director of the Institute of Information and Communication Technologies - BAS, I was included in the Scientific Jury of the competition for occupation of the academic position "Professor" in the Scientific Field 4. Natural Sciences, Mathematics and Informatics, the Professional Area 4.6 Informatics and Computer Science, the Scientific Specialty 01.01.12. "Informatics", announced in the Darjaven Vestnik, Issue 41 of May 21, 2019, for the needs of the Hierarchical Systems Department at the Institute of Information and Communication Technologies - BAS, with the sole participant in the competition - Associate Professor Vladimir Vasilev Monov, PhD.

Vladimir Vasilev Monov was born on November 10, 1957 in the town of Pleven. He received his Master's Degree in Automation of Production Processes in 1982 from the Technical University - Sofia. From February 1, 1984 he was enrolled as a doctoral student at the Institute of Technical Cybernetics and Robotics at the Bulgarian Academy of Sciences, with mentor Academician Ivan Petkov Popchev. He obtained the degree of Candidate of Technical Sciences (PhD) in 1988 by decision of the Higher Attestation

Commission with Protocol No. 6 of November 3, 1988. Since 1984, he has been appointed to a scientific position at the Bulgarian Academy of Sciences, having been consecutively in the composition of the following institutes - Institute of Cybernetics and Robotics (ITCR-BAS), Institute of Informatics (II-BAS), Institute of Information Technologies (IIT-BAS) and Institute of Information and Communication Technologies (IICT-BAS). In 1999 he was appointed Associate Professor at the Institute of Information Technology (IIT-BAS) and since 2010 he has held the same position at the Institute of Information and Communication Technologies (IICT-BAS).

As a member of the Scientific Jury I have received the following documents:

1. Order No. 181 of 19.07.2019 of the Director of the Institute of Information and Communication Technologies;

2. Application for participation in the competition by Associate Professor Vladimir Vasilev Monov;

3. A European Curriculum Vitae of Associate Professor Vladimir Vasilev Monov;

4. Copy of the diploma for educational and scientific PhD degree of Associate Professor Vladimir Vasilev Monov;

5. Certificate of work experience in the specialty of Associate Professor Vladimir Vasilev Monov;

6. List of scientific publications of Associate Professor Vladimir Vasilev Monov;

7. List of scientific publications, with which the applicant participates in the competition, which do not repeat the ones submitted for the acquisition of the educational and scientific PhD degree and for the occupation of the academic position "Associate professor";

8. Copy of patent application of Associate Professor Vladimir Vasilev Monov inventions;

9. List of Associate Professor Vladimir Vasilev Monov noted quotations;

10. Summaries of the scientific publications with which the applicant participates in the competition - in Bulgarian and English;

11. Copies of all scientific publications with which the applicant participates in the competition;

12. Information for fulfillment of the minimum national requirements under Art. 2b, # 2 and # 3 and the requirements of the Institute of Information and Communication Technologies - BAS under Art. 2b, # 5, prepared, based on documents submitted for the competition provided by Associate Professor Vladimir Vasilev Monov;

13. Reference for the original scientific and applied scientific contributions of Associate Professor Vladimir Vasilev Monov;

14. Official notes for the applicant's participation in research and application projects;

15. Separation protocol between co-authors of monographic work;

16. Comments on the results of the candidate's works presented in the competition;

17. Statement for no proven plagiarism in the scientific works of Associate Professor Vladimir Vasilev Monov.

According to the requirements of the *Development of Academic Staff Act in the Republic of Bulgaria* and the specific requirements in the Act's Institutional Regulation, the candidates for occupying the academic position of "Professor" must meet the following conditions, regulated in Art. 29. (Darjaven Vestnik issue 81 of 2010 - Decision No. 11 of 05.10.2010 of the Constitutional Court of the Republic of Bulgaria under cadastral plot No. 13/2010; amend in full, issue 101 of 2010; amend. and supplement, issue 30 of 2018, effective 05.05.2018) (1):

1. Have acquired the educational and scientific PhD degree;

2. Have held the academic position of "Associate Professor" at the same or another higher education institution or scientific organization for at least two academic years or at least five years;

3. Have submitted published monographs or equivalent publications in specialized scientific editions that do not repeat the ones submitted for the PhD degree and for the academic position of "Associate Professor";

4. Have submitted other original research papers, publications, inventions and other scientific and applied developments that are evaluated as aggregate;

5. To comply with the minimum national requirements under Art. 2b, # 2 and # 3, respectively, of the requirements of art. 2b, # 5;

6. Not to have plagiarism proven in the statutory order in scientific works.

(3) Applicants shall submit a report on the fulfillment of the minimum national requirements under Art. 2b, # 2 and # 3, respectively, of the requirements of art. 2b, # 5, and a reference to the original scientific contributions, to which the relevant evidence set out in this Act, in the regulation for its implementation, and the regulations of higher schools and scientific organizations.

Associate Professor Vladimir Vasilev Monov fulfills the requirement of Art. 29 (1) item 1 of the *Development of Academic Staff Act in the Republic of Bulgaria*, because by a decision of the Presidium of the Higher Attestation Commission at the Council of Ministers of the Republic of Bulgaria, based on a protected PhD Thesis's on the topic "Decentralized management of large-scale linear systems", a diploma No. 14 was issued, for the scientific degree Candidate of Technical Sciences (PhD), Protocol No. 6 of 03.10.1988.

Associate Professor Vladimir Vasilev Monov also meets the requirement of Art. 29 (1) item 2 of the *Development of Academic Staff Act in the Republic of Bulgaria*, because the official note with Ex. No. 597 of June 28, 2019, signed by the Director of the Institute of Information and Communication Technologies, Prof. Galia Angelova, certifying that Associate Professor Vladimir Vasilev Monov has a total work experience in the specialty of 32 years and 9 months at date of competition.

Associate Professor Vladimir Vasilev Monov also fulfills the requirement of Art. 29 (1) item 3, as a published collective monographic work is presented:

Monov V., N. Futekova, *ERP Systems: Effectiveness of the Implementation Process*, Monograph, Institute of Knowledge Society Publishing House, ISBN8978-619-7128-06-2, 209 pp., Sofia, 2015.

The submitted documents for participation in the competition contain "List of publications of Associate Professor Vladimir Vasilev Monov" containing 103 articles, 1 monograph and 1 patent application.

For his participation in this competition for academic position, Associate Professor Vladimir Vasilev Monov has presented a list of 25 titles, 6 of which are independent, publications with one co-author are 16 and with two co-authors are 3.

Associate Professor Vladimir Vasilev Monov also fulfills the requirement of Art. 29 (1), item 4, having submitted a patent application:

Alexandrov A. K., V. V. Monov, *Method and Device for Monitoring and Integration of Meteorological Stations Data*, Patent Application for Invention No. 112400 of 17.10.2016, Patent Office of the Republic of Bulgaria.

From the analysis of the competition papers submitted by the applicant we can conclude that the peer-reviewed publications "do not repeat the ones submitted for the acquisition of the educational and scientific PhD degree and for the occupation of the academic position "Associate Professor", in accordance with the requirements of Art. 29 (1), item 3 of the *Development of Academic Staff Act in the Republic of Bulgaria*.

For participation in the competition, Associate Professor Vladimir Vasilev Monov has presented a list of 66 citations. It is important to note that 30 citation publications have been noted, which have been indexed and referenced in Scopus and / or Web of Science editions, which also fulfills the specific conditions for acquiring academic degrees and occupying academic positions "Professor" in the Institute of Information and Communication Technologies - BAS.

Contributions to peer-reviewed works on the assumption of equal participation of the co-authors can be briefly presented in two groups, by accepting summary estimates according to the author's reference, classified in the following thematic scientific fields:

1. Matrix theory and application of matrix analysis in the study of dynamic systems and processes;

2. Modeling, analysis and optimization in information and communication systems.

The reviewer believes that it is definitely worth focusing on some of the contributions formulated by the applicant, such as:

1. Generalized Newtonian inequalities involving elementary symmetric functions of complex variables have been proved, [34]. The result substantially broadens and generalizes Newton's classical inequalities over the field of complex numbers.

2. A criterion characterizing the spectral set of a convex set of square matrices is obtained. The spectral characteristics of the real and imaginary parts of the spectrum of the matrix set are derived, [30].

3. The problem of existence and construction of non-trivial reducing spaces of square matrices is considered. Criteria for the reducibility of a single matrix are obtained, which is summarized also for the case of simultaneous reducibility of a pair of matrices. An approach is proposed for constructing reduction spaces using the theoretical apparatus of multilinear algebra, [33].

4. Relations between the eigenvalues and the diagonal elements of square matrices with complex elements have been established and proved, [36]. The results are specialized in the case of nonnegative matrices.

5. Formal-mathematical apparatus for description and study of bi-linear matrix products has been developed. Algebraic and vector-matrix properties, spectral properties and properties of the matrix trace and the determinants of the two products have been derived and proved, [38, 39]. Their applications in bifurcation theory, Lyapunov stability theory and their relation to the so-called Lyapunov matrix are given.

6. Methods for optimization of the topology and energy efficiency of wireless sensor networks have been developed, [96, 97]. An adaptive method for the generation of sensor clusters has been developed based on a known approach for weight clustering of the sensor network.

7. Innovative nanotechnology has been developed for the renovation and replacement of the working surface of shafts used in industrial production for extrusion of sheet non-metallic materials, [57].

8. A prototype of a wireless sensor module with intelligent functions has been developed, including sensors for measuring temperature, humidity and barometric pressure, as well as a built-in module for GPS coordination, [69].

I accept the contributions formulated by the applicant in the works with which Associate Professor Vladimir Vasilev Monov participates in the competition, the results being scientific, scientifically applied and applied in nature and can be defined as enrichment of an existing scientific field with new knowledge.

Associate Professor Vladimir Vasilev Monov was a member of a team of eleven research and applied projects, two of which he was a leader.

Associate Professor Vladimir Vasilev Monov is a supervisor of three PhD students, one of which is successfully defended.

According to the information provided for the fulfillment of the minimum national requirements and the minimum requirements of Institute of Information and Communication Technologies - BAS by Associate Professor Vladimir Vasilev Monov, he fully covers the minimum requirements for indicators A, C, D, E and E for the Scientific Field 4. Natural Sciences, Mathematics and Informatics, the Professional Area 4.6. Informatics and Computer Sciences, the Scientific Specialty 01.01.12. Informatics.

I accept the Declaration submitted by the applicant that there is no legally proven plagiarism in the scientific works presented for this competition by Associate Professor Vladimir Vasilev Monov.

In conclusion, I agree that the requirements of the Law for the *Development of Academic Staff Act in the Republic of Bulgaria* and the specific requirements in the Act's Institutional Regulations for its implementation, the Rules for the conditions and the order for acquiring academic degrees and for the occupation of academic positions in BAS and the Rules for the specific conditions for acquisition of academic degrees and occupation of academic positions at the Institute of Information and Communication Technologies - BAS are accomplished. After getting acquainted with the materials submitted by the applicant for the competition, I give my positive estimation about the choice of **Associate Professor Vladimir Vasilev Monov** in the competition for the

academic position of "**Professor**" for the needs of the Hierarchical Systems Department of the Institute of Information and Communication Technologies - BAS, in the Scientific Field 4. Natural Sciences, Mathematics and Informatics, the Professional Area 4.6. Informatics and Computer Sciences, the Scientific Specialty 01.01.12. Informatics.

I propose that the Scientific Jury unanimously vote for a proposal to the Scientific Council of the Institute of Information and Communication Technologies - BAS, to elect **Associate Professor Vladimir Vasilev Monov** for the academic position of "**Professor**" in the Scientific Field 4. Natural Sciences, Mathematics and Informatics, the Professional Area 4.6. Informatics and Computer Sciences, the Scientific Specialty 01.01.12. Informatics.

16.09.2019   Signature: ....

Sofia   /Prof. Lyubka Doukovska, PhD, DSc/