REVIEW

by Prof. Eng. Ivaylo Stefanov Stoyanov, PhD
Ruse University "Angel Kanchev"

of the materials submitted for participation in the competition for the academic position of **"Professor"** at the Institute of Robotics "St. Apostle and Evangelist Matthew" of the Bulgarian Academy of Sciences

Field of Higher Education: 5. "Technical Sciences"
Professional Field: 5.2. "Electrical Engineering, Electronics, and Automation"
Scientific Specialty: "Elements and Devices of Automation and Computer Engineering"
Scientific Organization: Institute of Robotics "St. Apostle and Evangelist Matthew" at the Bulgarian Academy of Sciences
Scientific Unit: Section "Robotics in Energy"
Announcement in the State Gazette: Issue No. 61 of July 29, 2025

1. General Provisions and Biographical Data

In the competition for the academic position of "Professor," announced in the *State Gazette*, issue No. 61 of 29.07.2025, and on the website of the Institute of Robotics "St. Apostle and Evangelist Matthew" at the Bulgarian Academy of Sciences, for the needs of the Section "Robotics in Energy," the sole applicant who submitted documents is Assoc. Prof. Eng. Iliyan Hristov Iliev, DSc.

At present, the candidate holds the academic position of *Associate Professor* in the aforementioned section of the Institute. The competition was announced based on a decision of the Scientific Council of the Institute of Robotics "St. Apostle and Evangelist Matthew," according to Protocol No. 5 of 31 May 2024.

By Order No. 62 of 23 July 2024, issued by Assoc. Prof. Eng. Siya Lozanova, PhD, Deputy Director of the Institute of Robotics, I was appointed as a member of the Scientific Jury for the competition. At the first meeting of the Scientific Jury, held on 03.10.2025 (Protocol No. 1), I was elected as the reviewer responsible for preparing the present review.

For the purposes of the competition, Assoc. Prof. Eng. Iliyan Hristov Iliev, DSc, has submitted all materials required under the *Internal Rules for the Development of the Academic Staff* of the Institute of Robotics at the Bulgarian Academy of Sciences. These materials were provided to me in electronic form.

No formal violations of the competition procedure or improper use of external results (plagiarism) were found in the candidate's submitted scientific works.

From the submitted CV, the professional development of Assoc. Prof. Eng. Iliyan Iliev, DSc can be traced as follows: He graduated from the Technical University of Gabrovo in 2001 with a professional qualification as *Electrical Engineer*. Over the years, he has held various positions, including: Head of the Energy-Mechanical Department, "Kula Ring" AD; Group Leader; Unit Head; Dispatcher RDS – Vidin, "Electro distribution Pleven" – Vidin Branch; Head of Regional Unit for Vidin and Montana, "CEZ Distribution Bulgaria" AD; Transmission Engineer in the "Operation and Maintenance of Transmission Network Assets" Department of the "National Electric Company" EAD; Chief Expert in the "Licensing and Control" Department, Directorate "Regulation and Control – Electric and Heat Energy" at the Energy

and Water Regulatory Commission; Member of the State Energy and Water Regulatory Commission (SEWRC); and Manager "Marketing and Sales" at "Hydroenergy Group" OOD.
His academic career began in 2014 with doctoral studies in *Electric Power Supply and Electrical Equipment* (professional field 5.2. Electrical Engineering, Electronics, and Automation) at the Technical University of Gabrovo, where he obtained the educational and scientific degree *Doctor* in 2016.
In 2017, he was appointed *Assistant Professor* in the Department of "Electric Power Supply and Electrical Equipment" at the University of Mining and Geology "St. Ivan Rilski." Later that same year, he became *Senior Assistant Professor*, and since 2024 – *Associate Professor* in the same department.
In 2025, he joined the Institute of Robotics "St. Apostle and Evangelist Matthew", where he currently holds the positions of Head of Laboratory "Robotic Systems in Energy" and Head of the Section "Robotics in Energy." In the same year, he was awarded the scientific degree "Doctor of Sciences."
The candidate continually enhanced his qualifications during his studies and professional experience. He is a member of the Chamber of Engineers in the Investment Design, has held numerous managerial positions, and is proficient in English and Russian.

2. General Description of the Submitted Materials
Assoc. Prof. Eng. Iliyan Iliev, DSc, participates in the competition for the academic position of *Professor* by presenting for review a total of 24 scientific works, including:

- 1 monograph,
- 21 scientific publications, and
- 2 textbooks.

The textbooks are acknowledged but not reviewed here, as they have undergone prior review before publication.

The candidate submitted the following documents for participation in the competition:

1. Curriculum Vitae (European format)
2. Copies of diplomas for the degrees *Doctor*, *Doctor of Sciences*, and for the academic position *Associate Professor*
3. List of scientific publications submitted for the competition, excluding those used for obtaining the degrees *Doctor* and *Doctor of Sciences* or for the position *Associate Professor*
4. List of citations
5. Abstracts of the scientific publications (in Bulgarian and English)
6. Copies of all scientific publications included in the competition
7. Statement on fulfillment of the minimum national requirements for the position of Professor, grouped according to NACID indicators
8. Statement on fulfillment of the minimum requirements according to Art. 2b, para. 2 and 3 of the *Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB)* for the corresponding scientific field
9. Summary of original scientific and applied contributions
10. Declaration of originality
11. Completed Declarations (Appendix 1 and Appendix 2) under the Internal Rules of the Institute of Robotics at BAS
12. Proof of payment of the application fee to the Institute of Robotics – BAS

Table 1. Distribution of Points by Groups and Indicators

Group / Minimum Required Points (per ZRASRB and TU–Sofia standards)	Indicator	Candidate's Points for the Procedure	Details
A / 50	Indicator 1	**50**	A.1. Doctoral dissertation for the educational and scientific degree "Doctor" – Diploma No. 29222 of 23.07.2004
B / 100	Indicator 3	**100**	B.3. Habilitation work – Monograph
C / 200	Sum of indicators 7–8	**202.35**	C.7. Scientific publications in editions referenced and indexed in *SCOPUS* – 2 pcs. → 23.33 pts C.8. Scientific publications in non-referenced peer-reviewed journals or edited collective volumes – 49 pcs. → 179.02 pts
D / 100	Sum of indicators 12–14	**114**	D.12. Citations in scientific journals referenced and indexed in *SCOPUS* – 1 × 10 pts = 10 D.13. Citations in monographs and collective peer-reviewed volumes – 6 × 3 pts = 18 D.14. Citations or reviews in non-referenced peer-reviewed journals – 43 × 2 pts = 86
E / 150	Sum of indicators 17–29	**200**	E.16. Scientific degree "Doctor of Sciences" – 40 pts E.17. Supervision of successfully defended PhD students – 3 (2×40 + 20) = 100 pts E.23. Published university textbooks – 2 pcs = 60 pts
Total Points			**616.35**

3. General Characteristics of the Candidate's Research and Applied-Scientific Activity

The development of the electric-power system is a process influenced by numerous factors: the type of power-electrical equipment, the modernization and construction of new facilities, the use of local renewable-energy resources, and others. All these factors have a substantial effect on the operation of power-supply systems and installations. This obliges the scientific community to address a number of energy-related problems, the primary one being the quality of the supplied electrical energy.

This problem is of interest not only to researchers and energy-supply companies but also to consumers, who increasingly raise justified demands—either due to awareness of their rights or because of the installation of modern equipment sensitive to power-quality requirements.

The main challenges in this context may be summarized as follows: electromagnetic compatibility, energy efficiency, and reliability of power supply. Therefore, tasks related to the quality of electrical energy in medium- and high-voltage distribution networks, the

management of electricity generation and consumption, reduction of energy dependence, sustainable development of the power sector, improvement of energy security, and competitiveness have come to the forefront.

Assoc. Prof. Eng. Iliyan Iliev, DSc has studied, investigated, and solved parts of these problems in different aspects. His presented scientific works may be grouped as follows:

A) Publications examining the condition, applications, perspectives, and reliability problems of power supply, systematizing principal properties, states, and factors influencing supply reliability [C7.1, C7.2, C8.1–C8.8, C8.14, C8.17–C8.19];

B) Publications studying the performance of electrical equipment, investigation of failures in mining-industry enterprises, photovoltaic plants, electronic converters, preventive maintenance, analysis of damages and failures, etc. [C8.5, C8.6, C8.11, C8.13, C8.16];

C) Publications devoted to software tools and models for various assemblies of elements in the power-supply system [C7.2, C8.4, C8.6, C8.15, C8.20, C8.21];

D) Publications concerning regulation and distribution of devices for compensation of reactive loads [C8.8, C8.13, C8.18, C8.20].

Classification of the publications:

- Refereed in *SCOPUS* – 2 items
- Non-refereed journals and proceedings of scientific conferences – 19 items
- Reports – 21 items
- In English – 6 items
- In Bulgarian – 15 items

In 4 papers Assoc. Prof. Iliev is sole author; in 9 – first author; and in 8 – co-author.

The candidate meets the requirements of Art. 29 (1) of the Law on the Development of the Academic Staff (ZRASRB): he holds the educational and scientific degree *Doctor* and the scientific degree *Doctor of Sciences* (professional field 5.2), has presented a habilitation monograph, and has submitted other original research papers (21 in total). A statement verifying fulfillment of the national minimum requirements and a list of his scientific output are attached. All groups of indicators under the Law and the Internal Rules of the Institute of Robotics at BAS are satisfied for holding the position of *Professor*. The documentation includes four independent publications and two with SJR (*SCOPUS*). The total number of points is 616.35 against the required 550, thus fully meeting the standard. No reports of plagiarism or procedural violations have been identified.

4. Evaluation of Pedagogical Preparation and Teaching Activity

According to the submitted CV, Assoc. Prof. Iliev has over seven years of teaching experience. He has lectured to bachelor and master students in professional field 5.2 on numerous subjects, including: Installation and Operation of Electrical Equipment; High-Voltage Engineering; Renewable Energy Sources for Industrial Enterprises; Electricity Trade; Energy Efficiency; Technology and Techniques for Using Solar Radiation; Electrical Networks and Systems; Short-Circuit Analysis in Electrical Systems; Power Supply.

He participated in the authors' collectives developing curricula for these disciplines. He has supervised 24 successfully defended diploma projects and 5 successfully defended doctoral students. Authored or co-authored textbooks and teaching aids include:

- Iliev, I. *Innovative Theoretical Framework for Compensation of Reactive Loads*, Textbook, "Print Factor" Ltd., Sofia, 2024, 112 pp., ISBN 978-619-7427-27-1.
- Kirov, R.; Iliev, I. *Techno-Economic Efficiency of Reactive Load Compensation under Partial Load Conditions*, Textbook, "Print Factor" Ltd., Sofia, 2021, 124 pp., ISBN 978-619-7427-08-0.

His scientific interests are focused on reliability of power supply, electrical equipment, development of software tools and models, and compensation of reactive loads.

5. Impact of the Candidate's Scientific Publications (Citations)

Assoc. Prof. Iliev has presented a citation record including:

- 1 citation in refereed and indexed journals in world-renowned databases;
- 6 citations in peer-reviewed monographs and collective volumes;
- 43 citations or reviews in non-refereed peer-reviewed journals.

According to *SCOPUS* data as of 30 October 2025, the candidate has 9 citations registered and an h-index = 2. He has served on scientific juries for awarding the *Doctor* degree and for academic-position competitions.

6. Main Scientific and Applied Contributions

The contributions of Assoc. Prof. Iliev cover the full scope of research in electrical engineering, electronics, and automation. Some of the most significant are summarized below. **Scientific Contributions:**

- An innovative theoretical framework has been proposed to evaluate the dependence of power-supply reliability on deteriorated power quality. The methodology was tested for assessing the operational lifetime of power transformers and determining additional reliability indices of electrical networks.
- It has been theoretically proven that the failure-free operating time of insulation follows the Weibull distribution. Real-world data confirmed that the mean restoration time of medium-voltage cable networks also obeys this distribution, enabling rational optimization of system reliability.
- A comprehensive multifactor approach based on *Design-of-Experiments Theory* was developed for research, analysis, and optimization. Its application to power-engineering facilities produced mathematical models allowing process optimization with high adequacy and reliability.
- A graph-analytical method for normalization of power-quality indicators (PQE) was synthesized, providing fast, accurate mechanized accounting and establishing new progressive principles for PQE standardization.
- Based on in-depth analysis of possibilities to enhance energy efficiency of electric drives, a holistic approach enabling digitalization in power-system management was proposed.
- Methodologies for selection or design of reactive-power compensating components were proposed and verified.

Applied-Scientific Contributions:

- Experimental studies proved the strong influence of deteriorated PQE on the failure intensity λ (t) of almost all major power and switching elements of the electrical-supply system, demonstrating correlation between λ (t) and load dynamics.
- Experimental verification showed degraded reliability of many power components, with λ (t) and R (t) values markedly worse than recommended benchmarks.
- Circuit-engineering solutions were proposed to improve operational reliability of 110 kV substations and synchronous motors, increasing fault-free performance.
- It was demonstrated that under asymmetric and non-sinusoidal regimes, the service life of power transformers decreases up to tenfold, significantly reducing national-system reliability.

- Regression equations and coefficients of determination for key technological factors were derived.
- Both experimental and theoretical analyses proved that minimizing reactive loads generated by power equipment reduces specific electricity consumption.

Practical Contributions:

- The theoretical framework for determining partial active-power losses due to deteriorated PQE was applied in two industrial companies, confirming the methodology's validity and effectiveness.
- A new concept for evaluating asymmetric and non-sinusoidal regimes using weighted current-asymmetry and harmonic-distortion coefficients was developed and successfully validated in an industrial facility.
- The developed theoretical approaches for assessment of resonance phenomena enable their study under real conditions and the definition of suppression measures, demonstrating innovative character.
- A method for assessing electrical efficiency via active- and reactive-load utilization coefficients was proposed, verifying compliance with EMC indicators under reduced-consumption modes.
- Recommendations were formulated for evaluating electromagnetic objects in industry, quantifying additional active-power losses caused by electromagnetic disturbances and their interactions.
- Measures were proposed to reduce the electromagnetic component of economic losses due to voltage asymmetry by determining additional power losses and shortened insulation lifetime; corresponding formulas for depreciation adjustments were developed.
- A methodology for evaluating the payback period of compensating installations was created, considering both low-level effects (line and transformer losses) and high-level effects (loss reduction, power-quality improvement, equipment life extension, penalty avoidance, etc.).

7. Significance of the Contributions for Science and Practice

As noted, two of the candidate's publications are indexed in *SCOPUS*. He has participated in numerous national and international scientific conferences, is a member of the Chamber of Engineers in the Investment Design, has held managerial posts, served on scientific juries, and acted as an expert in company-commissioned projects. The overview of Assoc. Prof. Iliev's activity clearly shows that he is well known to the scientific community. His research has produced theoretical, applied-scientific, and practical contributions in the fields of power-supply systems and networks, automation systems for their management, and reactive-load compensation. Overall, the candidate demonstrates diverse scientific and applied output and a moderately limited teaching workload. His combined achievements are assessed positively. The materials submitted meet the national minimum requirements for holding the position of *Professor* in professional field 5 "Technical Sciences," area 5.2 "Electrical Engineering, Electronics, and Automation," as well as the specific internal requirements of the Institute of Robotics at BAS.

8. Critical Remarks and Recommendations

No critical remarks regarding the work of Assoc. Prof. Iliev are identified. Some publications contain partial repetitions, which is inevitable within research series.

Recommendations:

- To continue his publication activity more intensively in prestigious international journals with bibliometric impact;
- To promote the work of the *Section "Robotics in Energy"* and pursue research and implementation projects;
- To strengthen his teaching activity, particularly with postgraduate students and PhD candidates.

9. Personal Impressions and Reviewer's Opinion

I know Assoc. Prof. Eng. Iliyan Iliev, DSc from our joint participation in scientific juries. He is an erudite lecturer with solid technical culture and sound theoretical preparation. I hold excellent impressions of his public and organizational activity.

10. Conclusion

I positively evaluate the candidate's scientific, applied-scientific, and teaching activity. This activity meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, its Implementing Regulations, and the Internal Rules of the Institute of Robotics at the Bulgarian Academy of Sciences. Therefore, I propose that Assoc. Prof. Eng. Iliyan Hristov Iliev, DSc, be elected to the academic position of Professor at the Institute of Robotics – BAS, in the field of higher education 5 "Technical Sciences," professional field 5.2 "Electrical Engineering, Electronics and Automation," scientific specialty "Elements and Devices of Automation and Computer Engineering."

03 November 2025

Reviewer:
(Prof. Eng. Ivaylo Stoyanov, PhD)