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REVIEW

by Prof. DSc Eng. Iliyan Hristov Iliev

Institute of Robotics "St. Apostle and Evangelist Matthew" – Bulgarian Academy of Sciences (BAS)

concerning the scientific materials submitted for participation in the competition for the academic position of Associate Professor at Burgas State University Prof. Dr. Assen Zlatarov, Burgas

Field of higher education: 5. Technical Sciences
Professional field: 5.2. Electrical Engineering, Electronics and Automation
Scientific specialty: Power Supply and Electrical Equipment
Institution: Burgas State University Prof. Dr. Assen Zlatarov
Academic unit: Department of Electronics, Electrical Engineering and Mechanical Science
Announcement in the State Gazette: No. 65 of 17 July 2026

1. General Provisions and Biographical Information

In the competition for the academic position of Associate Professor, announced in the *State Gazette*, No. 65 of 17 July 2026, and on the website of Burgas State University Prof. Dr. Asen Zlatarov, Burgas, for the needs of the Department of Electronics, Electrical Engineering and Mechanical Science, Chief Assistant Professor Vasil Borisov Ivanov was the sole candidate to submit an application and the required supporting documents. The candidate currently holds the position of Chief Assistant Professor in the same department at the university.

For the purposes of the competition, the candidate, Chief Assistant Professor Vasil Borisov Ivanov, has submitted the materials required under the Internal Rules for the Development of the Academic Staff of Burgas State University Prof. Dr. Asen Zlatarov. These materials were provided to me in electronic format. I have identified no formal irregularities in the competition procedure, nor have I found any instances of plagiarism or improper use of other researchers' results in the candidate's submitted scientific publications.

The curriculum vitae provides an overview of the professional career of Chief Assistant Professor Vasil Borisov Ivanov, who graduated from the Technical University of Varna in 1998, obtaining a professional qualification as an Engineer in Electronics and Communications. Throughout his career, he has held various positions, including Maintenance Technician for Supervisory Control and Data Acquisition (SCADA) Systems, SCADA Systems Maintenance Engineer, Chief Energy Engineer at Burgas Free University (BFU), Electronics Teacher at the Vocational High School of Mechanical and Electrical Engineering (PGMEE) in Burgas, Assistant Professor in the Department of Electronics, Electrical Engineering and Mechanical Science, and subsequently Chief Assistant Professor in the same department.

In 2013, following a competitive recruitment procedure, he was appointed to the academic position of Assistant Professor in the Department of Electronics, Electrical Engineering and Mechanical Science at Burgas State University Prof. Dr. Asen Zlatarov, Burgas. His doctoral studies began in 2015, when he enrolled in a doctoral program in *Power Supply and Electrical Equipment*, within Professional Field 5.2, *Electrical Engineering, Electronics and Automation*, at the University of Ruse "Angel Kanchev". In 2017, he was awarded the PhD degree. Following a competitive recruitment procedure in the same year, he was appointed to the academic position of Chief Assistant Professor in the same department, where he continues to work.

The candidate has continuously enhanced his professional qualifications throughout his education and professional career. He possesses computer skills in modelling electrical circuit diagrams and block diagrams using MATLAB/Simulink. He is also proficient in software tools such as Adobe Photoshop and Adobe Illustrator, which he uses for the graphical representation of circuit diagrams, figures, and charts. In addition, he has a good command of English and Russian.

Research areas covered by the publications

A) Design, implementation, and investigation of stand-alone photovoltaic systems (SAPV systems) [2.1, 3.3, 3.4, 3.8, and 3.11]

Publications [2.1, 3.6, 3.8, and 3.11] investigate laboratory setups based on stand-alone photovoltaic systems, featuring an architecture comprising solar panels, rechargeable batteries, modern inverters equipped with maximum power point tracking (MPPT) algorithms, and intelligent monitoring and control systems. An algorithm has been developed to evaluate the performance of a solar inverter through daily monitoring based on actual measurements of solar irradiance and temperature, while also accounting for seasonal variations in photovoltaic system operation [2.1, 3.4, 3.8, and 3.11].

Publications [3.3 and 3.4] investigate practical photovoltaic power supply systems designed to power an IP camera operating continuously and a thermoelectric cooling system based on a Peltier module. Their energy efficiency and suitability for applications requiring an uninterrupted power supply have been demonstrated.

Publication [3.5] investigates the performance of a separately excited DC motor using an experimental test bench and analyses its mechanical characteristics under different load conditions. The experimental results are shown to be consistent with the theoretical principles governing electrical machines.

B) Simulation and modelling of energy processes

The main research activities in the field of simulation focus on the modelling, analysis, and optimising of energy processes using modern software tools such as MATLAB/Simulink.

Publications [2.2, 2.3, 3.1, 3.2, 3.7, and 3.10], which focus on modelling photovoltaic systems in the MATLAB/Simulink environment, investigate variations in their operating parameters through simulations of electrical circuit diagrams and individual components, including photovoltaic panels, power electronic converters (voltage-source inverters), power transmission cable lines, and electrical loads.

- The simulation-based method for improving the quality of an inverter's output electrical quantities, presented in publications [2.2, 2.3, 3.1, and 3.10], employs models of passive notch filters. Virtual measurements and analysis of higher-order harmonics in the frequency spectrum using the fast Fourier transform (FFT) indicate a reduction in total harmonic distortion (THD) and improved electromagnetic compatibility.
- Models of series and parallel RLC circuits under different operating conditions (R, RL, and RC), developed in MATLAB/Simulink, are used to investigate resonance phenomena and frequency-selective properties, as reported in publications [2.2, 2.3, 3.1, and 3.10]. Measurements and analyses performed after the addition of filters demonstrate a reduction in total harmonic distortion and an improvement in the power factor.

- Modelling of a voltage-source inverter using phase control with a variable duty cycle is presented in publication [3.7]. The proposed approach, based on experimentally determined duty-cycle values of 35% and 50%, optimises the conversion process for a modified sinusoidal waveform, significantly reducing active power losses ((P_T)).
- The publication on improving the efficiency of three-phase power transmission lines [3.9] employs a compensation model based on capacitor banks. This approach reduces active power losses and stabilises the voltage magnitude at the output terminals supplying the electrical loads.

The modelling approaches presented in publications [2.2, 2.3, 3.1, 3.2, 3.7, 3.9, and 3.10], implemented through simulations in MATLAB/Simulink and supported by analysis of the results, demonstrate improvements in the efficiency, reliability, and power quality of stand-alone and hybrid photovoltaic systems.

The scientific works submitted by Vasil Borisov Ivanov, PhD, for participation in the competition comprise 14 scientific publications, one monograph, and four teaching aids, as follows:

- **Monograph:** 1
- **Practical exercises in electrical measurements:** 1
- **Circuit diagrams, tests, and questions in electrical measurements:** 1
- **Laboratory practice in electromechanical devices:** 1
- **Interactive module on electromechanical devices: circuit diagrams, tests, and questions:** 1
- **Scientific publications indexed in Scopus:** 3
- **Scientific publications in peer-reviewed journals and conference proceedings not indexed in Scopus:** 11, including 9 papers published in university proceedings and 2 conference papers.

Vasil Borisov Ivanov, PhD, is the sole author of 10 publications and a co-author, listed after the first author, of the remaining 4 publications.

The candidate meets the requirements set out in Article 24(1), item 1, of the Regulations for the Implementation of the Academic Staff Development Act in the Republic of Bulgaria, as he holds the PhD degree in Professional Field 5.2, Electrical Engineering, Electronics and Automation.

He also fulfils the requirement under Article 24(1), item 2, having held the academic position of Chief Assistant Professor for at least two years in Professional Field 5.2, Electrical Engineering, Electronics and Automation.

Vasil Borisov Ivanov, PhD, has submitted a sole-authored monograph, teaching aids, and scientific publications, comprising a total of 18 works, thereby fulfilling the requirement under Article 24(1), item 4. He has also submitted a statement demonstrating compliance with the national minimum requirements, together with a list of his scientific output.

Compliance with the Academic Staff Development Act and the Internal Rules for the Development of the Academic Staff of Burgas State University Prof. Dr. Assen Zlatarov has been established for all groups of indicators applicable to the academic position of Associate Professor.

Among the submitted documents, the candidate has listed 10 sole-authored publications, two of which have a SCImago Journal Rank (SJR) indicator and are indexed in Scopus. Vasil Borisov Ivanov, PhD, has accumulated a total of 280 points, exceeding the required minimum of 220 points, and therefore fulfils the applicable requirements.

With regard to the requirement under Article 24(1), item 5, no plagiarism has been identified in the candidate's scientific works, and no reports or allegations of plagiarism have been submitted pursuant to the Academic Staff Development Act.

2. Assessment of the candidate's teaching qualifications and academic activities

According to the submitted curriculum vitae, Vasil Borisov Ivanov, PhD, has 13 years of teaching experience at Burgas State University Prof. Dr. Assen Zlatarov.

The candidate has delivered lectures to students in Professional Field 5.2 at both bachelor's and master's degree levels in the following subjects: electrical machines and apparatus; electromechanical and pneumatic devices; diagnostics and control of electromechanical devices; electrical measurements; measuring and control instruments; electrical engineering and electrical measurements; applied electrical engineering and electronics; renewable energy sources; non-conventional and renewable energy sources; and renewable energy systems.

The candidate has also actively participated as a member of the academic teams responsible for developing curricula for the following subjects: electromechanical and pneumatic devices; diagnostics and control of electromechanical devices; electrical measurements; measuring and control instruments; electrical engineering and electrical measurements; applied electrical engineering and electronics; renewable energy sources; and renewable energy systems.

Vasil Borisov Ivanov, PhD, has supervised 20 diploma students specialising in electrical engineering and 9 specialising in electronics.

Vasil Borisov Ivanov, PhD, is the author of one monograph and four sole-authored teaching aids:

- **Monograph:** Vasil Borisov Ivanov, *Investigation of Solar Voltage-Source Inverters through Modelling and Practical Implementation*, 2025, Burgas State University Prof. Dr. Assen Zlatarov, Burgas, ISBN 978-619-273-123-6.
- **Teaching aid:** Vasil Borisov Ivanov, *Practical Exercises in Electrical Measurements*, 2025, Burgas State University Prof. Dr. Assen Zlatarov, Burgas, ISBN 978-619-273-163-2.
- **Teaching aid:** Vasil Borisov Ivanov, *Circuit Diagrams, Tests, and Questions in Electrical Measurements*, 2025, Burgas State University Prof. Dr. Assen Zlatarov, Burgas, ISBN 978-619-273-164-9.
- **Teaching aid:** Vasil Borisov Ivanov, *Laboratory Practice in Electromechanical Devices*, 2025, Burgas State University Prof. Dr. Assen Zlatarov, Burgas, ISBN 978-619-273-170-0.
- **Teaching aid:** Vasil Borisov Ivanov, *Interactive Module on Electromechanical Devices: Circuit Diagrams, Tests, and Questions*, 2025, ISBN 978-619-273-171-7.

The research interests of Vasil Borisov Ivanov, PhD, focus on the design, implementation, and simulation of original models using MATLAB/Simulink for the investigation of photovoltaic systems, converters, inverters, cable lines, resonant filters, and electrical loads.

3. Impact of the candidate's scientific publications on the research community (citations)

Vasil Borisov Ivanov, PhD, has submitted documentation confirming nine citations of his publications in scientific sources abstracted and indexed in internationally recognised

databases. According to Scopus records as of 30 September 2026, the candidate has received nine citations indexed in Scopus.

4. Main scientific and applied scientific contributions

The contributions presented in the publications of Vasil Borisov Ivanov, PhD, cover a broad range of research activities involving modelling and practical implementation in the fields of electrical engineering, electronics, and automation. The following are some of the principal scientific and applied scientific contributions.

Scientific contributions:

- The synthesis of monitoring data on the energy yield of photovoltaic systems under actual operating conditions establishes correlations between solar irradiance, ambient temperature, and seasonal variations. The findings on seasonal changes in energy generation and conversion efficiency in solar inverters enable statistical analysis of the effects of daylight duration, solar irradiance, and temperature on their operation.
- The original models developed by the author in the MATLAB/Simulink environment provide an integrated approach to the investigation and optimisation of electrical power systems and photovoltaic systems, enabling their adequate representation under actual electrical operating conditions.
- Series resonance in an RLC circuit has been investigated through simulation, analysing the relationships between circuit element parameters, source frequency, and the electrical and energy characteristics of the circuit.
- The modelling of resonance-based passive filters in simulated switched-mode power supply systems, including converters and inverters, improves output power quality and reduces total harmonic distortion (THD) associated with active power losses.
- A simulation-based approach to reducing active power losses during energy transmission along power lines connecting a generator and a consumer has been developed using compensation models based on capacitor banks.

Applied scientific contributions:

- A methodology for investigating solar inverters and photovoltaic systems in MATLAB/Simulink has been developed and implemented using block diagrams and electrical circuit schematics representing converters, power sources, cable lines, measuring instruments, filters, and electrical loads [monograph, 2025; 3.2, 3.7].
- Inverter models have been developed and integrated with passive notch and resonant filters to investigate and improve the harmonic content of output current and voltage. The influence of control parameters and operating load conditions has been analysed using spectral analysis and Fourier-based computational methods [2.2, 3.7, 3.10; monograph, 2025].
- A statistical approach has been applied to assess solar irradiance based on actual measurements obtained from an operating photovoltaic system [2.1, 3.8, 3.11]. Relationships between climatic factors, including solar irradiance and temperature, and the electrical energy generated have been established. Seasonal performance and system utilisation indicators have been determined, and models suitable for forecasting energy production and designing photovoltaic systems have been developed.

- A three-phase inverter model incorporating a realistic power supply system configuration has been developed in MATLAB/Simulink. The harmonic content of the output voltage has been analysed in terms of total harmonic distortion (THD), and a solution based on selective notch filters has been proposed [2.2, 3.10]. The application of these filters has been shown to improve electromagnetic compatibility and increase the power factor, while achieving a conversion efficiency of up to 98%.
- Operating modes of a series RLC circuit have been modelled using Simulink [2.1]. Agreement between the theoretical relationships and simulation results has been demonstrated. The resonant operating mode, in which the power is entirely active, has been analysed, and the risks of overvoltage and overcurrent under resonance conditions have been identified. Practical applications in industrial systems, including induction heating and generators, have also been presented.

Practical contributions:

- Stand-alone photovoltaic systems have been implemented and investigated for supplying power to a thermoelectric cooling system, an IP camera, and electrical loads through an inverter operating in uninterruptible power supply (UPS) mode. Their energy performance, energy flow management, and the conditions required for reliable operation have been analysed [3.3, 3.4, 3.8].
- An experimental test bench has been developed to investigate a separately excited DC motor, enabling its operating characteristics to be determined under different load conditions [3.5].
- Long-term monitoring and experimental investigations of actual photovoltaic systems and a solar inverter have been conducted. Electrical and energy performance indicators have been processed and analysed to assess seasonal operating behaviour and system efficiency [2.1, 3.8, 3.11].

5. Significance of the contributions to science and practice

Vasil Borisov Ivanov, PhD, has been a member of the academic staff of Burgas State University Prof. Dr. Assen Zlatarov for 13 years, teaching subjects related to renewable energy sources (RES), electromechanical devices and systems, electrical engineering, and electronics.

The review of the scientific publications, monograph, and teaching aids authored by Vasil Borisov Ivanov, PhD, indicates that his work has resulted in scientific, applied scientific, and practical contributions to the theory, practical implementation, and modelling of photovoltaic systems and devices incorporating intelligent control and monitoring. The candidate has a diverse portfolio of scientific and applied scientific activities related to engineering practice and teaching. I give a positive assessment of the candidate's overall academic and professional activities.

The materials submitted for the competition meet the minimum national requirements for appointment to the academic position of Associate Professor in Field of Higher Education 5, Technical Sciences, specifically Professional Field 5.2, Electrical Engineering, Electronics and Automation, as well as the specific requirements of Burgas State University Prof. Dr. Assen Zlatarov.

6. Critical remarks and recommendations

There are no critical remarks regarding the work of Vasil Borisov Ivanov, PhD. Some publications contain a degree of repetition, which is understandable in a series of studies addressing related topics, such as photovoltaic systems.

I recommend that the candidate:

- pursue his publication activities more actively, primarily in reputable international journals with established scientometric indicators;
- increase the visibility of his research through research and technology transfer projects;
- strengthen his research activities in areas related to renewable energy sources (RES), in collaboration with postgraduate and doctoral students.

7. Personal impressions and the reviewer's opinion

I became acquainted with Vasil Borisov Ivanov, PhD, through the materials submitted to me following my invitation to participate as a member of the academic jury and as a reviewer in the assessment of the candidate for the academic position of Associate Professor. After a thorough examination of the submitted materials, I have concluded that Vasil Borisov Ivanov, PhD, has a strong technical background, sound theoretical knowledge, and solid practical skills.

8. Conclusion

I give a positive assessment of the candidate's scientific, applied scientific, and teaching activities. These activities meet the requirements of the **Academic Staff Development Act in the Republic of Bulgaria**, the Regulations for its implementation, and the Internal Rules for the Development of the Academic Staff of Burgas State University Prof. Dr. Assen Zlatarov.

In view of the foregoing, I recommend the appointment of Vasil Borisov Ivanov, PhD, to the academic position of Associate Professor at Burgas State University Prof. Dr. Assen Zlatarov, in Field of Higher Education 5, Technical Sciences, Professional Field 5.2, Electrical Engineering, Electronics and Automation, and in the scientific specialty of Power Supply and Electrical Equipment.

3 November 2026

Reviewer:
/Prof. DSc Eng. Iliyan Iliev/