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REVIEW

by Prof. Anatoliy Trifonov Aleksandrov, PhD, Eng.

of the materials submitted for participation in the competition for the academic position of Associate Professor in the field of higher education 5. Technical Sciences, professional field 5.2. Electrical Engineering, Electronics and Automation, scientific speciality Electrical Power Supply and Electrical Equipment (Non-conventional and Renewable Energy Sources).

Chief Assistant Professor Vasil Borisov Ivanov, PhD, is a candidate in the competition for Associate Professor announced in the State Gazette, No. 65 of 17 July 2026, for the needs of Burgas State University "Prof. Dr. Asen Zlatarov".

1. Brief biographical information

Vasil Ivanov obtained a Master's degree from the Technical University of Varna in 1998 and the educational and scientific degree of Doctor (PhD) in 2017 under the doctoral programme in Electrical Power Supply and Electrical Equipment, professional field 5.2. Electrical Engineering, Electronics and Automation, at the University of Ruse "Angel Kanchev". He has submitted a certificate of completion of an English language course.

Vasil Ivanov has extensive industrial experience. Between 1988 and 2010, he worked as an electronic equipment technician at the Training and Experimental Facility of the Technical University of Gabrovo; a television and radio equipment technician at Television and Radio Repair Services in Burgas; a maintenance technician for automated dispatch control systems, high-frequency equipment and radio transceivers at Elektrosnabdyavane in Burgas; a practical training teacher in electronics at the Technical School of Electronics in Sredets; a design and maintenance engineer for automated dispatch control systems, electronic and optical equipment and systems at "P. Mrezhi VN" in Burgas; Chief Power Engineer at Burgas Free University; and an electronics teacher at the Vocational High School of Mechanical and Electrical Engineering and Electronics in Burgas. Since 2013, he has successively held the academic positions of Assistant Professor (2013–2017) and Chief Assistant Professor (2017–present) at Burgas State University "Prof. Dr. Asen Zlatarov".

2. General description of the submitted materials

Chief Assistant Professor Vasil Ivanov is participating in the competition for the academic position of Associate Professor with 15 scientific works: one monograph (B3), 3 scientific publications (2.1–2.3; indicator Г7) in publications abstracted and indexed in internationally recognised scientific information databases (Scopus), and 11 scientific publications (3.1–3.11; indicator Г8) in non-indexed peer-reviewed journals or edited collective volumes. He has published 4 teaching aids (indicators E24.1–E24.4). All publications, as well as the two textbooks, were peer-reviewed before publication.

The publications may be classified as follows:

- By publication venue: articles in national journals and periodicals — 4 [2.1; 3.4; 3.5; 3.9]; papers in the proceedings of international scientific conferences held in Bulgaria — 4 [2.2; 2.3; 3.1; 3.10]; papers in university proceedings and yearbooks — 6 [3.2; 3.3; 3.6–3.8; 3.11].
- By language: publications in English — 14 [2.1–2.3; 3.1–3.11].
- By number of co-authors: single-author publications — 9 [2.2; 2.3; 3.1; 3.2; 3.5; 3.7–3.11]; publications with one co-author — 3 [3.3; 3.4; 3.6]; publications with two co-authors — 1 [2.1].

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

Chief Assistant Professor Vasil Ivanov has submitted a statement listing 9 citations in scientific publications abstracted and indexed in internationally recognised scientific information databases (indicator Д12 — 90 points). The minimum national requirement for indicator group "Д" is 50 points,

while the minimum requirement under the University Regulations of Burgas State University "Prof. Dr. A. Zlatarov" is 60 points. Four scientific works have been cited, one of them 6 times.

4. Overview of the content and results of the submitted works

The candidate meets, and in certain indicators exceeds, the minimum national requirements and the minimum requirements under the University Regulations of Burgas State University "Prof. Dr. A. Zlatarov". Chief Assistant Professor Vasil Ivanov, PhD, defended a dissertation entitled "Investigation of the Influence of Photovoltaic Systems on Electrical Networks" for the educational and scientific degree of Doctor (PhD), professional field 5.2. Electrical Engineering, Electronics and Automation, doctoral programme in Electrical Power Supply and Electrical Equipment. His diploma, No. РУ-НС-2017-13, was issued on 23 June 2017 by the University of Ruse "Angel Kanchev" (indicator A — 50 points).

He has submitted a habilitation work in the form of a monograph ("Investigation of Solar Voltage-Source Inverters through Modelling and Practical Implementation", Libra Scorp Publishing House, 2025, 117 pp., ISBN 978-619-273-123-6; indicator B.3 — 100 points); 14 scientific publications (indicator group Г — 280 points), comprising 3 publications (indicator Г7 — 90 points) in publications abstracted and indexed in internationally recognised scientific information databases (Scopus, Web of Science), and 11 publications (indicator Г8 — 190 points) in non-indexed peer-reviewed journals or edited collective volumes; and 9 citations (indicator group Д12 — 90 points).

The research and implementation activities of Chief Assistant Professor Ivanov (indicator group Е — 130 points) comprise participation in 1 national scientific or educational project (indicator Е18 — 10 points); leadership of 2 national scientific or educational projects (indicator Е20 — 40 points); and publication of 4 university teaching aids (indicator Е24 — 80 points).

Indicator group	Minimum national requirements for the academic position of Professor	Minimum requirements under the University Regulations of Burgas State University "Prof. Dr. A. Zlatarov"	Chief Assistant Professor Vasil Ivanov, PhD
А	50 points	50 points	50 points
Б	–	–	–
В	100 points	100 points	100 points
Г	200 points	220 points	280 points
Д	50 points	60 points	90 points
Е	–	–	130 points

Chief Assistant Professor Vasil Ivanov, PhD, Eng., has a total of 650 points, meeting, and in certain indicators exceeding, the scientometric requirements laid down in the minimum national requirements and in the University Regulations of Burgas State University "Prof. Dr. A. Zlatarov".

5. General assessment of the candidate's activities

5.1. Teaching activities (work with students and doctoral candidates)

Chief Assistant Professor Vasil Ivanov, PhD, is an established lecturer at Burgas State University "Prof. Dr. A. Zlatarov". He has 13 years of professional experience in higher education as a lecturer at the University.

According to the statement of classroom teaching hours submitted for the competition, he has taught 865 hours to students in the following degree programmes: Electronics and ESPM; Transport Engineering and Technologies; Computer Systems and Technologies; Software Engineering; HI; TSK; IM; TNG (Bachelor's degree — 573 hours); Electrical Engineering and AE (Professional Bachelor's

degree — 112 hours); and Electrical Engineering and Electronics (Master's degree — 180 hours). Over the last three years, he has taught 1469 hours at Bachelor's level: 472 hours in the 2023–2024 academic year (288 lecture hours; 184 practical class hours), 472 hours in 2024–2025 (288 lecture hours; 184 practical class hours), and 533 hours in 2025–2026 (308 lecture hours; 225 practical class hours). At Master's level, he has taught 771 hours: 187 hours in 2023–2024 (120 lecture hours; 67 practical class hours), 292 hours in 2024–2025 (240 lecture hours; 52 practical class hours), and 292 hours in 2025–2026 (240 lecture hours; 52 practical class hours).

Chief Assistant Professor Vasil Ivanov, PhD, is the author of 4 teaching aids published in 2025 by Burgas State University "Prof. Dr. Asen Zlatarov":

Practical Exercises in Electrical Measurements. A Teaching Aid for Students. ISBN 978-619-273-163-2;

Circuit Diagrams, Tests and Questions in Electrical Measurements. A Teaching Aid for Students. ISBN 978-619-273-164;

Laboratory Practice in Electromechanical Devices. A Teaching Aid for Students. ISBN 978-619-273-170-0.

Interactive Module in Electromechanical Devices: Circuit Diagrams, Tests and Questions. A Teaching Aid for Students. ISBN 978-619-273-171-7.

The candidate has developed syllabi for the following courses:

- Electromechanical and Pneumatic Devices and Electrical Measurements for the Bachelor's degree programmes in Electronics, Medical Electronics, and Electronic Systems in Industry and Medicine.
- Electrical Engineering and Electrical Measurements for the Bachelor's degree programmes in Software Engineering and Computer Systems and Technologies.
- Electrical Engineering and Electronics for the Bachelor's degree programme in Transport Engineering and Technologies.
- Applied Electrical Engineering and Electronics for the Bachelor's degree programmes in Oil and Gas Technology; Glass, Ceramics and Construction Binders Technology; Chemical Engineering; and Chemical Technologies.
- Diagnostics and Control of Electromechanical and Pneumatic Devices and Non-conventional and Renewable Energy Sources for the Master's degree programme in Electrical Engineering.
- Practical Training Part One and Renewable Energy Sources (RES) for the Professional Bachelor's degree programme in Electrical Engineering.
- Practical Training Part One and Electrical Measurements for the Professional Bachelor's degree programme in Automotive Electronics.
- Electrical Engineering and Electrical Measurements for the Professional Bachelor's degree programmes in Computer-Aided Industrial Design and Computer Systems and Technologies.

Since 2016, Chief Assistant Professor Vasil Ivanov, PhD, has supervised 9 Master's students in Electronics and 20 Master's students in Electrical Engineering, all of whom have successfully defended their theses.

The above information provides grounds for me to assess the pedagogical preparation and teaching activities of Chief Assistant Professor Vasil Ivanov, PhD, as very good.

5.2. Scientific and applied research activities

The candidate's works can be grouped into 2 thematic areas:

Design, implementation and investigation of stand-alone photovoltaic systems [2.1, 3.3–3.6, 3.8, 3.11].

Stand-alone photovoltaic systems have been investigated whose architecture comprises solar panels, rechargeable batteries, a modern inverter model incorporating a maximum power point tracking (MPPT) algorithm, and intelligent monitoring and control systems. An algorithm has been developed for

assessing the performance of a solar inverter through daily monitoring of solar radiation, temperature and photovoltaic system parameters.

Photovoltaic power supplies for an IP camera operating continuously and equipped with a thermoelectric cooling system incorporating a Peltier module have been investigated. Their energy efficiency and applicability to uninterruptible power supplies have been demonstrated.

The efficiency of a separately excited DC motor has also been investigated and evaluated through analysis of its torque–speed characteristics under different loading conditions.

Modelling, analysis and optimisation of energy processes using modern software environments (MATLAB/Simulink) [2.2, 2.3, 3.1, 3.2, 3.7, 3.9, 3.10].

Photovoltaic systems have been modelled in the MATLAB/Simulink environment. Variations in their operating parameters have been investigated by simulating circuit diagrams and modules, including photovoltaic panels, electronic converters — voltage-source inverters — and power transmission cable lines. The simulation method developed improves the quality of the inverter's output electrical quantities by using models of passive notch filters. Analysis of higher-order harmonics in the amplitude–frequency response indicates a reduced harmonic distortion factor and improved electromagnetic compatibility.

Resonance phenomena and frequency-selective properties have been investigated using the proposed models of series and parallel RLC circuits under different operating conditions (R, RL, RC). A reduction in the harmonic distortion factor and an increase in power factor have been recorded.

A voltage-source inverter has been modelled using phase control with a variable duty cycle. The specified duty cycle (35%/50%) optimises the modified sine-wave conversion process, significantly reducing active power losses.

The efficiency of three-phase power transmission lines has been improved by applying a compensation model using reactive components (capacitor banks), reducing active power losses and stabilising the voltage magnitude at the receiving end of the line.

Chief Assistant Professor Vasil Ivanov, PhD, has led 2 research projects funded by the University's Research and Artistic and Creative Activities Fund: Contract NIH 419/2018, entitled "Design, Implementation and Investigation of a Stand-Alone Intelligent Low-Power Supply System", and Contract NIH -535/2026, entitled "Investigation of the Energy Operating Modes of Stand-Alone Photovoltaic Systems Using Electronic and Electromechanical Converters".

He has been a team member in 6 research projects funded by the University's Research and Artistic and Creative Activities Fund: No. NIH -330/2014, "Development and Implementation of an Experimental Optical Sensor System"; No. NIH -351/2015, "Development of a System Based on Thermoelectric Energy Converters"; No. NIH -367/2016, "Practical Implementation and Experimental Investigation of a Photovoltaic Energy System"; No. NIH -402/2017, "Design and Implementation of a Thermoelectric Cooler Powered by a Photovoltaic System"; No. NIH -427/2019, "Design and Computer Simulation of New Energy-Efficient Area Lighting on the Campus of Prof. Dr. Asen Zlatarov University in Burgas"; and No. NIH -496/2024, "Investigation and Analysis of the Influence of Lighting Installations on Electrical Power Quality Indices".

Chief Assistant Professor Ivanov, PhD, has contributed to the establishment and development of the laboratory facilities of the Department of Electrical Engineering, Electronics and Mechanical Engineering at Burgas State University "Prof. Dr. Asen Zlatarov", having developed 10 laboratory training rigs.

He prepared 4 reviews for international scientific conferences indexed in Scopus between 2020 and 2024.

6. Contributions

I accept the contributions formulated in the submitted works. They are of an applied scientific and practical nature and concern the demonstration, by new means, of significant new aspects of existing scientific problems, as well as the generation of corroborating evidence in the investigation, modelling, optimisation and application of non-conventional and renewable energy sources.

6.1. Contributions of the habilitation work — monograph

- A new methodology has been developed for the design, modelling and investigation of solar systems and modules using MATLAB/Simulink.
- High-accuracy models of renewable energy sources have been developed.
- A methodology has been adapted for analysis through continuous monitoring of solar inverters in photovoltaic systems, tracking the characteristics of the converted energy. The effectiveness of the methodology has been validated experimentally.
- Original results concerning the harmonic components of the output current and voltage, expressed in terms of total harmonic distortion (THDi and THDu), have been obtained from the amplitude–frequency responses through computational synthesis.
- The effectiveness of optimising the inverter's operating mode by adding resonant filters at its output has been demonstrated. This reduces losses associated with significant higher-order harmonics and increases efficiency.

6.2. Contributions of publications other than those equivalent to a monograph

- Models of photovoltaic systems, single-phase inverters, power transmission lines, and resonant and oscillatory RLC circuits have been developed and integrated into circuit diagrams. The proposed models enable analysis of transient and steady-state operation and can be used in the design and optimisation of practical power supply and conversion systems [2.2, 2.3, 3.1, 3.2, 3.7, 3.10].
- A simulation method has been proposed for improving the quality of output electrical quantities by using passive notch filters. Virtual measurements with a spectrum analyser demonstrate the reduction of higher-order harmonics in the amplitude–frequency response and the improvement of electromagnetic compatibility in inverter systems [2.2, 2.3, 3.1, 3.10].
- General-purpose circuit models have been developed in MATLAB/Simulink for series and parallel RLC circuits under different operating conditions (R, RL, RC). The influence of the parameters on active power, impedance characteristics and resonance phenomena has been established. The applicability of these models to the design of frequency-selective and energy-efficient systems and devices has been demonstrated [2.2, 2.3, 3.1, 3.10].
- An integrated method has been proposed for the analysis and optimisation of power transmission networks by reducing active power losses, improving voltage quality, and introducing monitoring and control of key electrical parameters [2.1, 2.2, 3.7, 3.8, 3.9, 3.11].
- Stand-alone photovoltaic systems incorporating rechargeable batteries, inverters operating in UPS mode, and monitoring and control systems have been designed and investigated. The results demonstrate their reliability under different operating and loading conditions [2.1, 3.3, 3.4, 3.6, 3.8, 3.11].
- The influence of climatic and operational factors on photovoltaic systems has been investigated. A methodology has been developed for long-term monitoring and processing of operational data [2.1, 2.2, 3.4, 3.8, 3.11].
- Stand-alone renewable energy applications have been developed to supply low-power loads continuously, based on thermoelectric cooling systems incorporating Peltier modules. Their energy efficiency and applicability have been demonstrated [3.3, 3.4]. Electromechanical systems have also been developed and investigated [3.5].

7. Assessment of the candidate's personal contribution

I rate the candidate's contributions and achievements highly. The submitted works, citations and project participation meet the requirements of the Development of Academic Staff in the Republic of Bulgaria Act (ЗРАСРБ) and the minimum requirements under the University Regulations of Burgas State University "Prof. Dr. A. Zlatarov" for appointment to the academic position of Associate Professor.

8. Critical remarks and recommendations

I found no significant omissions in the candidate's works. I consider that the contributions could be consolidated. I recommend preparing papers for publication in journals with an impact factor (IF).

9. Personal impressions

I know Chief Assistant Professor Vasil Ivanov, PhD, as a respected colleague and lecturer. We have no joint publications. I am not a related party to him within the meaning of § 1, item 5 of the Supplementary Provisions of the Development of Academic Staff in the Republic of Bulgaria Act.

Conclusion

In conclusion, I give a positive assessment of the overall research and teaching activities of Chief Assistant Professor Vasil Ivanov, PhD, which fully meet the requirements for appointment to the academic position of Associate Professor. Sufficient and significant applied scientific contributions have been made.

In view of the foregoing, I recommend that Chief Assistant Professor Vasil Borisov Ivanov, PhD, be elected to the academic position of Associate Professor in the field of higher education 5. Technical Sciences, professional field 5.2. Electrical Engineering, Electronics and Automation, speciality Electrical Power Supply and Electrical Equipment (Non-conventional and Renewable Energy Sources).

15 October 2026

Reviewer:

/Prof. A. [illegible]androv/