

REVIEW

by **prof. Anatoly Trifonov Aleksandrov,**
Technical University of Gabrovo

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 direction: 5.2. Electrical Engineering, Electronics and Automation, specialty "Electric Power Supply and Equipment" (Lighting and Installation Equipment)

In the competition for the position of "associate professor", which has been announced in The State Gazette, issue 54 from 25.06.2024 and also on the website of the Technical University of Gabrovo, as a candidate for the needs of the department of "Mechanical Engineering, Computer Systems and Electrical Engineering" at the Technical College - Lovech participates Chief Assist. Prof. Eng. Milko Todorov Yovchev, PhD.

1. Brief biography

Milko Todorov Yovchev completed his secondary education at the "A. S. Popov" Professional High School of Electronic, Veliko Tarnovo, majoring in "Electronic equipment" in 2005. In the period 2005 - 2011, Milko Yovchev was a student at the Technical University - Gabrovo (TU-Gabrovo) and acquired the educational and qualification degree "Master of Science" in the specialty "Electric Power Engineering and Electric Equipment" with professional qualification "Electrical Engineering". From 2011 - 2015, he has worked as an assistant in the department of "Electric Power Supply and Equipment" at the Faculty of Electrical Engineering and Electronics (FEE) of TU-Gabrovo. From 2017-2018 he has worked as an electrical engineer in the same department. In 2019, he has obtained the educational and scientific degree "PhD" in the PhD program of "Lighting equipment and light sources". From 2019 until now, Milko Yovchev is the Ch. Assistant in the department of "Electric Power Supply and Equipment" at the Faculty of Electrical Engineering and Electronics of TU-Gabrovo.

Milko Yovchev is the only candidate in the competition for the academic position of "associate professor" in professional field - 5.2 Electrical Engineering, Electronics and Automation, specialty "Electric Power Supply and Equipment" (Lighting and Installation Equipment). The competition was announced in the State Gazette, issue 54 from 25.06.2024 and also on the TU-Gabrovo website and has been agreed upon the Academic Council of TU-Gabrovo (protocol No. 10/28.05.2024) and the Faculty Council of FEE (protocol No. 8/14.05.2024) with the proposal from the Department Council of the Department of Electric Power Supply and Equipment (protocol No. 17/09.05.2024).

2. General overview of the submitted materials

In this competition, Ch. Assist. Prof. Eng. Milko Yovchev is participating with 35 scientific publications of which: 10 works - equivalent to habilitation works and publications in journals, that have been referenced and indexed in globally recognized database with scientific information (indicator B.4), [B.4.1 – B.4.10]; 5 works - scientific publication printed in journals, that have been referenced and indexed in globally recognized database with scientific information (indicator G.7), [G.7.1 – G.7.5]; 20 works - scientific publications printed in previously reviewed scientific proceedings and journals (indicator G.8), [G.8.1 – G.8.20]. Also 1 textbook and 2 study guides whose co-author is Ch. Assist. Prof. Eng. Yovchev.

All publications can be classified as follows:

- By type: articles - 4; reports - 31.
- By importance: articles in Impact-ranked editions - 1 article [B.4.10 – SJR: 0.180]; awarded publications - 1 publication [G.8.18].
- By place of publishing: publications in referenced international editions - 15 [B.4.1 – B.4.10; G.7.1 – G.7.5]; reports in scientific proceedings from international scientific conferences abroad - 4

[G.7.4; G.8.2; G.8.14; G.8.20]; articles in national journals – 3 [G.8.3; G.8.15; G.8.16]; reports in scientific studies from international scientific conferences in Bulgaria - 27 [B.4.1 – B.4.9; G.7.1 – G.7.3; G.7.5; G.8.1; G.8.4 – G.8.13; G.8.17 – G.8.19]; reports in scientific university studies.

- By the language in which they are written: in English - 18 [B.4.1 – B.4.10; G.7.1 – G.7.5; G.8.2; G.8.14; G.8.20]; in Bulgarian - 17 [G.8.1; G.8.3 – G.8.13; G.8.15 – G.8.19].

- By number of the co-authors: independent - 4 [G.7.3; G.8.4; G.8.18, G.8.19]; with one co-author - 6 [B.4.7; G.8.1, G.8.2; G.8.4; G.8.5; G.8.7]; with two co-authors - 9 [G.7.1; G.7.2; G.8.2; G.8.3; G.8.5; G.8.8; G.8.10; G.8.14; G.8.16]; with three or more co-authors - 22 [B.4.1 – B.4.10; G.7.4; G.7.5; G.8.1; G.8.6; G.8.7; G.8.9; G.8.11 – G.8.13; G.8.15; G.8.17; G.8.20]. In 3 of the collaborative works [B.4.7; G.8.3; G.8.6] the candidate is in first place.

All publications, textbook and study guides have been previously reviewed before publishing.

3. Reflection of the scientific publications of the candidate, based on the scientific community (well-known citations)

Ch. Assist. Prof. Eng. Milko Yovchev, PhD, presents his reference for 10 citations of 3 scientific publications, as one of these works has been cited 5 times. According to the scientific publications, the citations are as follows:

- Citations in publications with IF – 1;
- Citations in publications referenced in Scopus – 9;

There are 8 citations from Bulgarian authors and 2 from foreign authors.

All these facts are enough for me to conclude that the candidate is a well-known author, who has published papers in significant scientific journals and proceedings in the area of the competition.

4. Overview of the content and results of the works that have been submitted

The candidate in the competition meets and exceeds the minimum national requirements on certain indicators. Ch. Assist. Prof. Eng. Milko Yovchev has a diploma for educational and scientific degree "PhD" in the PhD program of "Lighting equipment and light sources" (№ 0078/17.04.2019), issued by TU-Gabrovo. He has defended his dissertation on "Energy efficient optical systems for LED luminaires" (index A - 50 points). He has also presented 10 publications, equivalent to habilitation thesis, which are published in journals reviewed and indexed in globally recognized database with scientific information (indicator B - 182 points); 5 publications in a journal reviewed and indexed in globally recognized database with scientific information and 20 scientific publications in non-referenced journals and proceedings with scientific reviews or in edited collaborative works (group indicators G.7 - 103.33 points and G.8. - 188.02 pts.); 10 citations in scientific editions, reviewed and indexed in globally recognized database with scientific information (group of indicators D - 100 pts. - in indicator D.12).

Group of indicators	Minimum national requirements for the academic position of	Ch. Assist. Prof. Milko Yovchev
A	50 pts.	50 pts.
B	100 pts.	182 pts.
G	200 pts.	291.35 pts.
D	50 pts.	100 pts.
E	-	40 pts.

Ch. Assist. Prof. Eng. Milko Yovchev, covers and by certain indicators exceeds the scientometric data according to the minimum requirements of TU-Gabrovo. With the requirement of 15 publications, of which 4 are independent, he has submitted 35 publications, as 4 of them are independent. With the requirement of 5 citations, the candidate has 10. Dr. Yovchev is also the co-author of 1 textbook and 2 study guides.

Indicators	Minimum national requirements for the academic position of an associated professor at the Technical University of Gabrovo	Ch. Assist. Prof. Milko Yovchev
Total number of publications	15	35 [with SJR (Scopus) 1 item – B.4.10]
Independent publications	4	4
Number of known citations by other authors	5	10
Published textbooks	1	1
Published study guide	1	2
Leadership of projects and contracts	-	1

5. General characteristics of the candidate's performance

5.1. Teaching practice (work with undergraduate and postgraduate students)

Ch. Assist. Prof. Eng. Milko Yovchev, PhD, is an established lecturer at TU-Gabrovo. He has 11 years of work experience in the field of higher education, as 9 years of them are a part of his teaching experience at TU-Gabrovo. According to the presented report on the schedule of classes that have been held at TU-Gabrovo for the last 5 years, he has spent 1282 hours with both full-time and part-time students in the following disciplines for the specialty “Electric Power Supply and Equipment”: “Lighting and installation equipment”, “Design of lighting systems”, “Electric power supply”, “Industrial electric power supply”, “Optimization and control of electric power supply systems”.

Dr. Yovchev is co-author of 1 textbook and 2 study guides.

- Tsankov, P., M. Yovchev. Lighting and installation equipment. “Vasil Aprilov” University Publishing House, Gabrovo, 2024, ISBN 978-954-683-701-1. (200 pages), <https://epublish.tugab.bg/uchebni-materiali?task=download.send&id=126&catid=35&m=0>;

- Tsankov, P., M. Yovchev. Guide for coursework in lighting and installation equipment. “Vasil Aprilov” University Publishing House, Gabrovo, 2022, ISBN 978-954-683-669-4. (101 pages), <https://epublish.tugab.bg/uchebni-materiali?task=download.send&id=111&catid=35&m=0>;

- Tsankov, P., M. Yovchev. Manual for laboratory exercises in power supply. “Vasil Aprilov” University Publishing House, Gabrovo, 2017, ISBN 978-954-683-572-7. (100 pages).

The candidate in this competition is the author/co-author of the study programs in the follow disciplines:

- “Optimization and control of electric power supply systems” and “Luminaires and control gear” – in the educational and qualification degree "master" for the specialty of “Electric Power Supply and Equipment”;

- “Light source”, “Computer-aided design of luminaires and lighting systems” and “Energy efficiency of lighting systems” – in the educational and scientific degree "PhD" in the PhD program of “Lighting equipment and light sources”.

Main assistant Dr. Milko Yovchev was the supervisor of 50 graduates who successfully defended their theses.

The above-mentioned facts give me reason to assess the pedagogical preparation and activity of Main assistant Yovchev as very good.

5.2. Scientific and scientific-applied activities

Ch. Assist. Prof. Eng. Milko Yovchev, was in charge of 1 university research project (Contract 2308E/2023 “Study of photometric and electrotechnical characteristics of LED luminaires, volt-ampere characteristics and efficiency of photovoltaic modules”). He also participated in 8 university research projects in the field of modern energy efficiency of lighting systems, renewable energy sources, energy-efficient electric drives, modeling and simulation of modern objects and systems in the power industry.

Ch. Assist. Prof. Eng. Milko Yovchev has been involved in:

- Two international scientific research projects:

1) RAAND-2014/104568 “Development and production of innovative energy-saving industrial luminaires with built-in LEDs”, funded by the Norwegian Financial Mechanism 2009-2014 - Green Industry Innovation Programme. Duration: 24 months (2014 – 2016);

2) Project FRESHER (Find Research Everywhere, Share and Experience), funded by the EU under the HORIZON 2020 program, activities Maria Sklodovska-Curie "European night of scientists". Duration: 12 months (2018 – 2019);

- Two projects under operational programmes:

1) Project CoC “Smart Mechatronic, Eco- and Energy Saving Systems and Technologies“, № BG05M2OP001-1.002-0023 - supported by the European Regional Development Fund within the OP “Science and Education for Smart Growth 2014 – 2020”;

2) Project No101112876 – MountResilience – HORIZON-MISS-2022-CLIMA-01-06 “Accelerating transformative climate adaptation for higher resilience in European mountain regions”, funded under the Horizon Europe program; duration: 01/09/2023 – 29/02/2028.

Dr. Yovchev has an award for the best paper from the International Scientific Conference UNITECH 2022 (Yovchev, M. Study of the LED Lighting Flicker for Indoor Application. ISC UNITECH 2022, Gabrovo, 18-19 November 2022, pp. I 36-41. ISSN: 1313-230X).

He participated in the following scientific forums: UNITECH; Balkan Light Junior; International Energy Forum, BullLight; Lighting; Contemporary Materials; Applications of Mathematics in Engineering and Economics (AMEE), etc.

Dr. Milko Yovchev was the reviewer of 4 scientific publications in magazines reviewed and indexed in globally recognized database with scientific information: IEEE Junior Conference on Lighting (Lighting 2022, 2023, and 2024).

Ch. Assist. Prof. Eng. Milko Yovchev is a member of the following organizations:

- National Committee for Lighting in Bulgaria (NKO – Bulgaria);
- Chamber of Engineers in the Investment Design – Certificate 20029.

The candidate’s publications can be summarized in 4 thematic areas:

- *Optical systems of LED luminaires for street and indoor lighting: three-dimensional computer modeling, photometric analysis and optimization*

Three-dimensional computer models of optical systems with secondary optical lenses, diffusers and reflectors of LED luminaires for street and indoor lighting have been developed [B.4.2, B.4.3, G.7.3, G.8.19]. A photometric analysis of the modeled optical systems was performed, based on the Monte Carlo Raytracing probabilistic-statistical computer method, and the main parameters of the method were studied - number of rays traced, number of ray reactions and minimum weight of the ray. The study of these parameters ensures the smoothness of the light distribution and the necessary statistical accuracy of the photometric results. The photometric parameters of the luminaires - luminous flux, light distribution, luminous intensity, beam angle, luminance, glare, and total efficiency were calculated. Optimization lighting engineering calculations were performed with the proposed models of optical systems of the LED luminaires according to different criteria of optimality, depending on their purpose [B.4.1 – B.4.3, G.7.2, G.7.3, G.8.19].

- *Photometric indicators of LED luminaires - study of the optical systems impact on the efficiency and glare rating*

The photometric characteristics of LED luminaires for street and indoor lighting with different variants of the optical system were studied by using a goniphotometric measurement system. The useful luminous flux of the luminaires, the losses in the elements of the optical system, the total luminous efficacy and the permissible glare rating of the luminaires are determined [B.4.6, G.7.2]. The influence of the optical system on the luminous flux flicker of the

LED luminaires has been studied [G.8.18]. The obtained photometric characteristics of the luminaires were used for lighting simulation calculations to evaluate the permissible glare rating and the realized average illuminance, average luminance and overall uniformity [B.4.7, B.4.9].

- *Color characteristics of lamps and luminaires - study of the influence of various factors and the photobiological effects of light*

The influence of the optical system with diffusers and optical lenses and the variation of the luminous flux on the colour characteristics of LED lamps and luminaires has been studied. Research has been carried out and analysis of the change of chromaticity coordinates, correlated colour temperature, total colour rendering index and the wavelength of peak radiant flux in the blue light region in the process of heating LED luminaires of different power, technology and housing type [B.4.4, G.7.5, G.8.9, G.8.13].

Studies on the photobiological safety of light from conventional and LED lamps and luminaires have been carried out by measuring the radiant flux in the visible spectrum with a spectroradiometer, and the results of spectral radiation in the range of the blue light hazard have been presented. A comparison of the spectral dependences of the weighting function for blue light hazard of LED luminaires with different values of the correlated colour temperature was made. An analytical dependence of blue light hazard efficacy of luminous radiation on the correlated colour temperature of the studied luminaires is defined [B.4.8, G.8.20].

- *Energy efficiency of indoor and street lighting systems*

Research in this field is aimed at increasing the energy efficiency of indoor and street lighting by implementing highly efficient LED lighting and a new system for controlling the lighting load schedule. Projects have been developed, the research of which includes: a survey of the existing lighting of educational buildings, streets and parks; development of CAD models with existing lighting arrangements; performing multivariate optimization lighting calculations of geometric, lighting and electrical indicators with consideration of the actual luminance characteristics and offering energy saving measures [G.8.1, G.8.3, G.8.4, G.8.6, G.8.10, G.8.12, G.8.16]. An assessment of the energy efficiency of the proposed technical solutions for the reconstruction of the indoor, street and park lighting systems was made.

6. Contributions

I accept the formulated contributions in the presented works. They have a scientific-applied and applied nature and are related to proving with new means essential and new aspects of existing scientific problems and obtaining confirmatory facts in the field of research, modeling, optimizing and application of lighting systems in lighting engineering.

6.1. Contributions in publications that are equivalent to a monography

Scientific-applied contributions

- A methodology has been developed for iterative three-dimensional computer modeling and photometric analysis of luminaires with different application [B.4.2, B.4.3, B.4.4].
- Iterative optimizations of optical systems of LED luminaires for indoor and street lighting were performed [B.4.1, B.4.9].
- Models of optical systems of LED luminaires for street and indoor lighting were created, and the light distribution, zonal luminous fluxes, luminance, glare rating and total luminous efficiency were determined [B.4.6, B.4.7].

6.2. Contributions in the publications, except those that are equivalent to a monography

Scientific-applied contributions

- An analytical dependence of blue light hazard efficacy of luminous radiation in the visible spectrum on the correlated colour temperature of electric light sources is defined [G.8.20].

- The light losses in the elements of optical systems of luminaires with different applications have been studied [G.7.2, G.7.3, G.8.18, G.8.19].
- The influence of various factors on the colour characteristics and photobiological safety of electric lamps and luminaires has been studied [G.7.5, G.8.7 – G.8.9, G.8.13, G.8.20].

Applied contributions

- CAD models of the existing lighting systems in human settlement in Bulgaria were developed as a scientific team, energy-saving measures were proposed based on optimized lighting engineering calculations and evaluation of the energy efficiency of the proposed technical solutions for the reconstruction of the lighting systems [G.8.1, G.8.3, G.8.4, G.8.6, G.8.10, G.8.12, G.8.16].

7. Evaluation of the personal contribution of the candidate

My assessment of the candidate's contributions and results in the competition is high. The presented works, quotations and participation in projects correspond to the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB) and the Regulations for its implementation, as well as the minimum requirements of TU-Gabrovo for the scientific and teaching activities needed for acquiring the academic position "associate professor".

8. Critical comments and recommendations

I did not find any significant gaps in the candidate's scientific works. I believe the contributions can be summarized in monography. I recommend preparing publications with IF.

Personal impressions

I know Ch. Assist. Prof. Eng. Milko Yovchev as a respected colleague. I have no publications with him. I am not related to him within the meaning of paragraph 1, p. 5 of the Additional provisions of the Law on the Development of the Academic Staff in the Republic of Bulgaria.

Conclusion:

Having in mind the above statements, I propose Ch. Assist. Prof. Eng. Milko Todorov Yovchev to be chosen for "associate professor" in the following field of higher education: 5. Technical Sciences, professional direction: 5.2. Electrical Engineering, Electronics and Automation, specialty Electric Power Supply and Equipment (Lighting and Installation Equipment).

05.11.2024

Reviewer: /signature/
/Prof. A. Aleksadrov, PhD/