R E V I E W

Regarding a Competition for an Academic Position of Associate Professor in
professional field: **5.2. Electrical Engineering, Electronics and Automation,**
discipline: **"Electrical Measurements",**
published in the State Gazette no. 38 of May 10, 2019
with a candidate **Chief Assist. Dr. Hristo Zhivomirov Karaivanov**
Member of the Scientific Jury: **Prof. Dr. Eng. Vencislav Cekov Valchev**

1. Background and biography

The competition for AP "Associate Professor" was announced by the proposal of the Department Board of the "TIE" Department, confirmed by a decision of the Faculty Board of the Faculty of Electrical Engineering of TU-Varna and later by the Academic Senate of TU-Varna. The only candidate who has submitted the application is Chief Assist. Dr. Hristo Zhivomirov Karaivanov. After consideration of the submitted documents, the applicant is admitted to the competition.
The candidate has graduated from the Vocational High School of Electrical Engineering - Varna, specialty "Electronic Engineering" with excellent grades in 2006. In 2010 he acquired Bachelor's Degree in the Technical University - Varna, specialty Communication Technology and Technologies. The grade of his Thesis is Excellent 6.00, the grade of his Graduate overall diploma is Excellent 5.97. In 2011 he graduated the Master's Degree Program at the Technical University of Varna, specializing in Communication Technology and Technologies. The grade of his Thesis is Excellent 6.00, the grade of his Graduate overall diploma is Excellent 6.00. In 2012 he was enrolled as a full-time doctoral student at the Department of Communication Technology and Technology at the Technical University of Varna, in the scientific field 5.3 "Communication and Computer Engineering", specialty 02.07.01 "Theoretical Foundations of Communication Technology". In 2012, he was appointed as a full-time lecturer with a four-year contract - Assistant Professor in Electrical Measurements, Department of Theoretical and Measurement Electrical Engineering, Technical University - Varna. He defended successfully his dissertation in 2016 in a scientific specialty 02.07.01 "Theoretical Foundations of Communication Technique" with the title "Investigation of the energy parameters of audio power amplifiers operating in class B mode".
Chief Assist. Dr. Hristo Karaivanov has been awarded many times: 5 times with a diploma from the Rector of TU-Varna for excellent grades; 2 times with gold badge for excellent grades; Personal award of Varna Municipality 2011, Technical Sciences Field. He is recognizable among the international community of MATLAB users, a regular presence in the Top 40 of Matlab developers in the world.

2. General description of the materials presented

The total number of the candidate's publications is 36. Among these, there are 8 used in the Doctoral dissertation thesis. Out of the dissertation, the candidate has 28 publications. There are 9 publications in total indexed in Scopus (Elsevier). In eight of these works he is the only author.
The applicant participates in the contest with monograph, indicator B.
Quotations (citations) of publications (within the meaning of ZRASRB) - a total of 12, including these, indexed in Scopus (Elsevier) and / or Web of Science (Thomson Reuters) are 8. Quotations

of creative appearances in Matlab Central - a total of 15, in this the number indexed in Scopus (Elsevier) and / or Web of Science are 9.
After acquainting with the presented list of publications, **I accept for review all the applicant's publications**.
After examining the applicant's publications, citations and other activities, I give the following reference about the fulfilling of the conditions for acquiring AP "Associate Professor" by groups of indicators for AHE "5. Technical Sciences ", Table 1.

Table 1. Report on the fulfillment of the conditions for acquisition of AP "Associate Professor" in the groups of indicators for the AHE 5. Technical Sciences

Group of indicators	**Metric group Content by metric**	**Minimum requirements for acquisition of AP Associate Professor**	**Points of Chief. Assistant Karaivanov**
A	Indicator 1	50	**50**
B	Indicator 2	---	**---**
C	Indicator 3 or 4	100	**100**
D	Sum of indicators 5 to 11	200	**240**
E	Sum of indicators 12 to 15	50	**62**
F	Sum of indicators 16 to 28	-	**--**
G	Indicator 29	30	**150**
	In total	430	**602**

In conclusion, after comparing with the requirements: the candidate Chief Assist. Dr. Hristo Karaivanov covers all groups of indicators for AP 'Associate Professor' of the minimum national requirements.

3. General characteristics of the scientific research work and implementation activities of the candidate

The applicant has participated in 10 scientific research projects in the period 2010-2019 - 7 internal for TU-Varna, 1 with direct national funding from the NSF and 2 with direct European funding. Two of these projects are ongoing:

- Contract №DN07 / 27 / 15.12.2016. "Investigation of the sustainability of the electricity system and frequency control in the predominant share of renewable energy production."
- Contract BG05M2OP001-1.002-0023-C01 Competence Center "Intelligent Mechatronic, Eco and Energy Saving Systems and Technologies". Laboratory C2.3. "Investigation of underwater noise, signals and vibrations of vessels and equipment."

The candidate is a member of IEEE (The Institute of Electrical and Electronics Engineers) - Signal Processing Society and Measurement and Instrumentation Society; Federation of Scientific and Technical Unions in Bulgaria (FSTU) - Varna Branch; Union of Scientists in Bulgaria (USB) - Varna Branch.
The scientific research and implementation activities of the candidate chief Assist. Dr. Hristo Karaivanov can be summarized in the following directions:

- measurement and evaluation of parameters and characteristics of signals (and hence systems) using computer-based data acquisition and digital signal processing systems, with emphasis on spectral analysis and synthesis.

- frequency measurement methods; amplitude ratio, phase difference; generation and measurement of noise signals; applicable time-frequency analysis; innovative data visualization in multidimensional space.

- obtaining of confirmation results concerning the spectral analysis and synthesis of discrete signals using a new approach; proposing new methods for measuring some electrical quantities and characteristics of bipolar ones.

Some of the publications are accompanied by links leading to the developed MATLAB codes, with visible citations in foreign scientific publications of some of the written MATLAB scripts available on the author's page.

My overall assessment of the applicant's scientific research and implementation work is very good.

4. Assessment of the candidate's pedagogical training and activities

The candidate has given laboratory work for full-time and part-time students at Bachelor's Degree and Master's Degree at dept. CTT and cat. TE, incl. "Electrical Measurements", "Measurements in Electronics", "Theory and Design of Circuits in Communications" of all low current and high current specialties - EE, ESEO, EOC, ETWEI, ARUKS, E, ICT, KST. Since 2016, he has lectured full-time and part-time students at Bachelor Degree Programs in Electrical Measurements and in Measurements in Electronics. He has managed 10 successfully passed graduates - 7 in Bachelor Degree and 3 in Master Degree.

Chief Assist. Dr. Hristo Karaivanov is the co-author of the teaching manuals on "Electrical Measurements", "Measurements in Electronics", "Manual for Sound and Image Processing" and "Manual for Theory and Design of Communication Circuits".

The presented information on the issued educational and methodical manuals on the subject of the competition is a good attestation for his work as a teacher.

My overall assessment of the applicant's pedagogical training and activities is very good.

5. Major scientific and implementation contributions

Regarding the monograph:

The current state of measurement processes and practical approches are analyzed, and the practical realization of training in measurements is stated. The theory of spectral analysis and synthesis is considered. New methods and algorithms for measuring basic quantities are proposed and proven.

Regarding the publications:

- Two software functions for short-term straight (STFT) and reverse (ISTFT) Fourier transformation are introduced, together with know-how for their practical application. The verification includes recommendations concerning the applied aspects of the use of the functions. An original approach is proposed to combat the synthesis-specific attenuation problems at the ends of the resynthesized signal and the possible reduction of its length.
- A method for generating of “color noise” type noise signals with an arbitrary spectral slope is proposed. Its applications in audio engineering, acoustics, microelectronics, measurement practice and simulations are analyzed.

- A new way of visually presenting of the results obtained from the short-term Fourier transformation of a signal in the time-frequency domain is proposed. The so-called 'irisogram' method allows better spectrogram perception by visually impaired people (eg color blindness or macular degeneration) and the application of the so-called "Iris diagnostics" of a signal.
- A new approach is presented for estimating the power parameters of Class B audio amplifiers under "realistic worst case" (RWC) operating conditions. This approach has been shown to approximate better the power parameters of the amplifier in real-world conditions.
- An unified approach is proposed to visualize the spatial characteristics of the speaker. It has been experimentally shown that the amplitude of sound pressure at a point in space depends on the frequency of the signal, which requires the use of four-dimensional graphics for its visualization. Through theoretical analysis and experiments, it has been shown that the proposed unified approach is suitable for a better explanation of the spatial characteristics of the loudspeaker.
- Development of MATLAB®-based software products for:
  - measuring the speaker pattern using the NI USB-6211 data acquisition system and the Data Acquisition Toolbox and Signal Processing Toolbox;
  - measurement of impedance characteristic (module dependency and phase impedance phase frequency) of a bipolar;
  - generation of audio measuring signals in the middle of Matlab®;
  - A-weighing filter integrated into a copyrighted software product running in the middle of Matlab®.

6. Significance of the contributions to science and practice

The significance of contributions to science can be judged by the number of publications in the SCOPUS database (7 issues visible at 10/31/2019), as well as the Hirsch index in SCOPUS (h-index = 2, at 10/31/2019).

The importance of the contributions to the practice can indirectly be judged by the applicant's participation in scientific research projects. Chief Assist. Dr. Karaivanov participated in 10 research projects in the period 2010-2019 - 7 internal for TU-Varna, 1 with direct national funding from the NSF and 2 with direct European funding. Two of these projects are ongoing. The applicant is actively involved in the projects listed.

The quantitative indicators of the criteria for occupation of the AP "Associate Professor" in the AHE Technical Sciences were met.

7. Critical notes and recommendations

I have no significant comments on the materials provided in the contest for AP "Assoc. Professor"

I recommend to Chief Assist. Dr. Karaivanov to publish in valuable scientific journals with an impact factor and in indexed scientific literature databases (SCOPUS, WoS). This will improve the candidate's citation and prominence, as well as contribute to a better rank of TU-Varna in rating systems.

8. Personal reviews and opinion of the reviewer

I have personal impressions of the applicant's scientific research and teaching activities and I know the projects he is working on. I was also a preliminary reviewer of his doctoral thesis. It is my impression that over the years Chief Assist. Dr. Karaivanov has shown his high commitment and diligence in fulfilling academic and scientific tasks.

CONCLUSION

The submitted scientific production and preparation of the applicant's documents are in accordance with the LDASRB and the Rules for its application in the part for AP 'Associate Professor'. The applicant's contributions are sufficient for the AP Associate Professor and are his own work. Proof is the fact that in the most of all publications the candidate is the first author.

On the basis of my acquaintance with the submitted scientific papers (summaries), the applied scientific and implementation contributions and the fulfillment of the minimum national requirements, I find it justified to propose **Chief Assist. Dr. Hristo Zhivomirov Karaivanov to ocuppy the academic position of Associate Professor** in Professional Degree 5.2 EEA at dept. TIE, Faculty of Electrical Engineering, Technical University - Varna.

04.11.2019
TU - Varna

Member of the Scientific Jury:
/ prof. Dr. Eng. Vencislav Cekov Valchev /