

## OPINION

by Prof. D.Sc. Eng. Ivo Krastev Malakov, Technical University - Sofia

of the materials submitted for participation in the competition for holding the academic position "Associate Professor" in the field of higher education – 5. Technical sciences, in professional field – 5.1. Mechanical Engineering, specialty – Methods, transducers and devices for measurement and control of physical-mechanical and geometric quantities

In the competition for associate professor, announced in the State Gazette, issue 50 of 15.06.2021 and on the website of the Technical University - Gabrovo for the needs of the Department of Mechanical and Precision Engineering at the Faculty of Mechanical and Precision Engineering, as the only candidate involved Ch. Assistant Professor Tsanko Vladimirov Karadzhev, PhD - Department of Mechanical and Precision Engineering, Faculty of Mechanical and Precision Engineering at the Technical University - Gabrovo

### **1. Overview of the content and results in the presented publications**

The submitted publications for participation in the competition include 1 monograph (C.3) on "Methods and tools for measuring physicomachanical quantities", 12 scientific publications in publications that are referenced and indexed in world-famous databases of scientific information (D.7), 21 scientific publications in unrefereed journals with scientific review or in edited collective volumes (D.8), 1 textbook and 1 manual for laboratory exercises. One of the publications (D.7.10) presented in the competition was published in an international journal with Impact Factor 2.638, and another 11 are in the SCOPUS database, all with SJR. The scientific works are systematized in four thematic areas.

The publications in the thematic area "Development and analysis of methods for measuring noise and vibration and dynamic measurements" are related to the development and analysis of methods for measuring noise and vibration for the purposes of vibroacoustic diagnostics of rotary and piston machines, study of sound absorption waves and resonant phenomena, development of mathematical models and analysis of new methods for measuring dynamic parameters of moving objects, etc.

In the thematic area "Development and analysis of methods for temperature measurement" the results of development and analysis of methods for contact and non-contact temperature measurement - microprocessor systems for signal processing from linear temperature sensors and for control of multi-channel electronic device for measuring of four temperatures, are presented; a method for non-contact temperature measurement with two photodetectors with different spectral sensitivity and a corresponding algorithm for processing the signals from the two receivers; multi-channel microprocessor system for determining the temperature regimes of electrical machines; models for analysis of the error of nonlinearity of the static characteristic, etc.

The publications in the thematic area "Methods for measuring illuminance, time, pressure and angular velocity" are related to the development and analysis of methods for measuring these characteristics. The results of the development of a multifunctional converter brightness-frequency and the ratio between two illuminances in the number of pulses are presented. Based on this converter, a microprocessor system for measuring illuminance with a single-chip microcontroller has been developed. In addition, the main parameters and characteristics of centrifugal tachometers are analyzed and a methodology for determining their static characteristics is proposed, etc.

In the thematic area "Laser technologies", a group of publications are related to the study of the influence of parameters such as power density, frequency, speed of marking of different laser technological systems on the process of laser marking of parts of different types of materials. Other publications in this field are related to the development of methods, algorithms and devices for measuring the power of laser radiation.

The candidate has also included seven other publications dedicated to various applied aspects of engineering design - methods for synthesis of gears with asymmetric tooth profile; a method for determining the absorption of transparent and opaque plastics; experimental determination of the amount of projectile for a training and practical mine for repeated use and shooting at short distances, etc.

I believe that the submitted works for participation in the competition are relevant to science and practice thematic areas and the candidate uses modern methods and tools to solve problems and achieve relevant goals.

## **2. General characteristics of the candidate's activity**

### **2.1. Educational-pedagogical activity (work with bachelor, master and doctoral students)**

I evaluate the pedagogical preparation of the candidate and his work as a teacher as corresponding to the level of the requested academic position on the basis of the following:

- He conducts lectures and laboratory exercises in the disciplines "Instruments for measuring physical and mechanical quantities", "Intelligent positioning systems" and "Processing of measuring signals", as well as laboratories in "Industrial control systems" and "Vibroanalysis and noise protection", included in the curricula of specialties at the Faculty of Medical Sciences - full-time and part-time education for the educational qualification degree "Bachelor" and "Master".

His high professional and language training, as well as his specializations in engineering pedagogy in Graz - Austria and in laser technology in LIM, Germany, contribute to the high level of lecturing to students.

- He has developed the curricula in the disciplines "Processing of measuring signals", "Instruments for measuring physico-mechanical quantities".

- To ensure the learning process, he has published a textbook on computer design in mechatronics and a manual for laboratory exercises on instruments for measuring physico-mechanical quantities.

- He has developed a number of stands that are used in the learning process.

### **2.2. Scientific and scientific-applied activity**

To participate in the competition, the candidate has submitted 1 monograph, 33 scientific publications (articles in journals and conference papers), of which 12 are in referenced and indexed publications (1 has an "impact factor" and 11 have an SJR in the database -data of SCOPUS), which is important evidence of the high level of scientific work of the candidate. Of the 33 publications (articles and reports), 5 are independent, and the remaining 28 co-authored (18 with two authors, 7 with three authors and 3 with more than three authors), in 9 of which the candidate is the first author. There are 10 papers in scientific conferences in Bulgarian and the rest in English. He is the author of 1 textbook and co-author of 1 textbook. I would like to note the systematic and methodical planning with which the publication activity of the candidate is organized. This shows sustainability in terms of scientific development, commitment and serious interests in the field of the competition.

The publications do not repeat the articles and reports for the acquisition of ESD "PhD" attached to the documentation for the competition.

In the list of citations for participation in the competition are presented 12 issues in scientific journals, referenced and indexed in world-famous databases with scientific information and 3 issues in non-refereed journals with scientific review. All this shows convincingly that the works of the candidate are known to the scientific community at home and abroad.

The candidate has participated in 6 national and international scientific and educational projects funded by various organizations.

Summary of the minimum national requirements by groups of indicators for the academic position of "Associate Professor" in field 5. Technical sciences, professional field 5.1 Mechanical engineering and the evidence presented by the candidate is shown in the table:

Group of indicators	Minimum national requirements for borrowing AP "Associate Professor"	Declared points by groups of indicators by the candidate
A	50	50
B	-	-
C	100	100
D	200	436
E	50	126
F	-	-

The analysis of the data shows that the requirements of LDACRB and RILDACRB are overfulfilled in all groups of indicators. The minimum requirements of the Regulations for acquiring scientific degrees and holding academic positions at the Technical University - Gabrovo are also met.

### **2.3. Implementation activity**

From the submitted official notes and service contract it is evident that the applicant has participated in 4 projects for the industry related to measurement of details, development of construction documentation for asymmetric tooth profile and design and construction of a foundation to reduce noise and vibration in rotary machines.

### **3. Contributions (scientific, scientific-applied, applied). Significance of contributions to science and practice**

I accept and evaluate positively the scientific-applied and applied contributions of the candidate, indicated in the report for the contributions prepared by him. They correspond to the professional field and the scientific specialty of the announced competition "Methods, transducers and devices for measurement and control of physical-mechanical and geometric quantities".

I believe that the scientific and applied contributions contained in the works of the candidate are relevant and important for the development and enrichment of research in the thematic areas in which he works. The presented works are also important for the practice with the necessary degree of applicability. Contributions can be attributed to the groups proving with new means of significant new aspects of already existing scientific fields, problems, theories, hypotheses; creating new classifications, methods, constructions, technologies and obtaining confirmatory facts.

### **4. Assessment of the candidate's personal contribution**

The personal participation of the candidate can be judged by the number of individual publications - 5, and in another 9 he is the first author, out of a total of 33 submitted in the competition. This gives me reason to say that the contributions are the personal work of the candidate or with his leading role.

### **5. Critical remarks and recommendations**

I have no significant remarks with which to challenge the main scientific and applied contributions in the presented works of Chief Assistant Professor Tsanko Karadzhov, PhD.

I recommend the candidate to concentrate his research activity in less thematic areas and to intensify the work on prestigious national and international projects, including as a supervisor.

### **6. Personal impressions**

I do not know the candidate personally, but from the presented scientific papers and precisely formed documents for participation in the competition, I believe that he is a

responsible, highly qualified scientist and lecturer. He enjoys authority among his colleagues at the university and specialists at home and abroad.

**7. Conclusion:**

**Based on my acquaintance with the materials of the competition, my positive assessments of the research, implementation and pedagogical activities of the candidate, the relevance and significance of the achieved scientific and applied contributions, I offer Chief Assistant Professor Tsanko Vladimirov Karadzhov, PhD to be elected "Associate Professor" in the field of higher education – 5. Technical Sciences, professional field – 5.1. Mechanical Engineering, specialty - Methods, transducers and instruments for measuring and control of physical-mechanical and geometric quantities.**

20.10.2021

Member of the jury: /signature/  
/ Prof. D.Sc. Eng. Ivo Malakov /